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Appraisal of speed-enforcement warning messages among young drivers: Influence of automatic versus human speed enforcement in a known or unknown location

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ABSTRACT

The present study investigated how young drivers assess speed-enforcement warning messages and how these messages affect their motivation to reduce speed. Stemming from deterrence theory (Gibbs, 1985; Homel, 1988) the factors of "celerity", "certainty", and "severity" of the sanction were explored as a function of type of speed enforcement (automatic radars vs. police officers) and knowledge of enforcement location (known vs. unknown). Coping factors (e.g., self-efficacy, response cost) from protection motivation theory (PMT; Rogers, 1983) were also considered as critical variables of compliance. Participants (245 students, 51% men) had to choose their speed behavior in a mental simulation of a driving episode on a freeway. As expected, the intention to speed was lower when speed-enforcement warning messages were announced than in the control situation. Threat-certainty ratings were higher when automatic radars were announced, but speeding intentions did not vary according to the automatic versus human type of speed enforcement. Furthermore, automatic radars were perceived as easier to cope with in a maladaptive way (i.e., self-efficacy for avoiding a sanction and adapting speed as a function of speed-enforcement location). An unknown speed-enforcement location was one way of decreasing both women's and men's speed. Men calculated a cost-benefit balance to avoid slowing down when they knew the enforcement location. Concerning the predictors of speeding intentions and motivations to reduce speed, self-efficacy ratings for reducing one's speed proved to be the best PMT predictor.

1. Introduction

Automatic speed enforcement (ASE) systems are now a common part of road-safety regulations in developed countries. In France, a large-scale information campaign (Briquet, Canel, & Nouvier, 2003; Hamelin, 2008) introduced ASE after the President of France, on July 14, 2002, announced the introduction of an ASE system by the end of the year (Delhomme, Cristea, & Paran, 2014). Approximately 1000 fixed, speed radars and 500 mobile devices were installed between late 2002 and 2005. This measure was effective, with an overall drop of 30% in road fatalities between 2002 and 2005 (ONISR, 2006), including a reduction of 38.3% in young-driver fatalities (fatalities went from 1281 in 2002 to 790 in 2005).

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Young drivers, and especially males, are involved in more crashes and injuries due to their speeding behavior (Stradling et al., 2003; Williams, Kyrychenko, & Retting, 2006). According to ONISR (2006), 23% of the French road fatalities in 2005 involved young drivers. These road fatalities are known to be associated with speeding (Harrison, Triggs, & Pronk, 1999). Speeding is generally considered by this group to be a way of mastering the driving process, testing one's skills, and exposing those skills to other road users or passengers (Gabany, Plummer, & Grigg, 1997; Maycock, 1995; Rolls & Ingham, 1992). Beyond mere transportation, speed represents a source of pleasure and excitement, as well as a feeling of freedom and a way of enhancing self-esteem (Delhomme, 2002; Lewis, Watson, White, & Elliott, 2013; Rothengatter, 1988). Men are particularly prone to speeding as compared to women (Harré, Foster, & O'Neill, 2005; Schmid Mast, Sieverding, Esslen, Graber, & Jancke, 2008) and are generally thought to be more risk-oriented when on the road (Laapotti, Kisknen, Hatakka, & Katila, 2001). Women, on the other hand, are seen as more safety-oriented (Meadows & Stradling, 1999). Beyond road behavior, women are more punishment-sensitive and men are more prone to behavioral risk-taking (Cross, Copping, & Campbell, 2011).

Since the beginning of ASE in France, the number of fixed and mobile speed radars installed on the French driving network has never stopped growing, and the number of fatalities continues to decrease. However, since 2014, the number of fatalities began to rise again, especially car fatalities, with an increase of 8% between 2014 and 2015, and a 7% increase in fatalities among young drivers (ages 18–24) during that same period, with speeding remaining one of the first causes of road fatalities (46%; ONISR, 2016). The present study focused on how French drivers, who are now familiar with ASE, appraise speed-enforcement warning messages and how they deal with this information. Our approach is founded on two main models: deterrence theory and protection motivation theory.

This paper is divided into four main sections, the first one of which hast three sub-sections. The first sub-section presents deterrence theory; the second, protection motivation theory; and the third, the aims of the present study and its hypotheses. The second section focuses on the method of our empirical research, and the third provides the results. The fourth section discusses the findings, their implications for policy-makers and safety actors, and the limitations of the study.

1.1. Deterrence theory and speed enforcement

Traditionally, deterrence theory was associated with criminal justice (Gibbs, 1985). It is based on the idea that people do not commit a crime because they are afraid of being caught. In a rational perspective, individuals are said to evaluate the consequences of their behavior, considering both the costs and the benefits. For a threat to be effective, the costs of committing an offense must be deemed higher than the benefits. This dissuasive mechanism refers more specifically to general deterrence, which has been differentiated from specific deterrence. General deterrence is based on the assumption that observing others being punished or being informed and warned about impending penalties for committing an offence (e.g., drivers exposed to speed-enforcement warnings) will engage individuals in legal behaviors in order to avoid negative consequences. Specific deterrence is based on the assumption that being sanctioned will discourage drivers from reproducing the forbidden behavior (Homel, 1988; Stafford & Warr, 1993; Watson, 1998). The present study deals with the process of general deterrence, where perceptions and risk evaluation are at the core.

Deterrence effects rest upon three main factors: certainty, celerity, and severity of the sanction. In the domain of road safety, certainty has proven to have the greatest impact on driving behavior (Briscoe, 2004; Homel, 1986). More than the severity of the sanction (e.g., penalties, driving license withdrawal) or the rapidity with which the sanction is applied, the certainty of being caught is a critical factor (Decker, Wright, & Logie, 1993; Nagin & Pogarsky, 2001; Von Hirsch, Bottoms, Burney, & Wikstrom, 2000), while efforts to increase vulnerability have demonstrated only a short-time deterrence effect (Ross, 1984). Deterrence theory (Andenaes, 1974; Harrison, 1998; Homel, 1988; Kennedy, 1983; Watson, Siskind, Fleiter, Watson, & Soole, 2015) is useful in understanding the effectiveness of speed enforcement (Høye, 2014; Jones, Sauerzapf, & Haynes, 2008; Retting, Kyrychenko, & McCartt, 2008; Stanojević, Jovanović, & Lajunen, 2013; Walter, Broughton, & Knowles, 2011). Insofar as people are able to anticipate future negative outcomes and costs, the threat of a sanction deters an individual from adopting an illegal behavior. Speed-enforcement warning messages, which alert drivers about the risk of sanctions, should deter them from engaging in speeding behavior. In other words, the core of the deterrence process is how motorists perceive and react to the threat of being caught and punished. Apart from the overall effect of speed-enforcement warnings, their perception may differ according to the kind of speed enforcement announced (e.g., mobile/fixed radars, human vs. automatic controls, point-to-point enforcement, etc.). Additionally, they may vary as a function of the level of controllability and familiarity with the situation (e.g., knowledge or not of enforcement locations, etc.).

In addition to threat certainty, the way individuals think they may cope with a threat is a critical component of the subsequent behavior. If a person perceives a risk of being caught and sanctioned in case of an offending behavior, he/she may engage in a coping appraisal, which will determine his/her subsequent behavior. Depending on the offender's willingness to adopt an adaptive or maladaptive behavior and his/her coping appraisal in the face of the threat, he/she may or may not pursue the violation. Indeed, the way individuals appraise their ability to cope with a threat may be goal-related. For instance, in case of speeding because of being in a hurry (vs. no time pressure), drivers may feel lesser (vs. greater) self-efficacy for reducing speed. So, coping-appraisal differences could help us gain a better understanding of why different speeding responses can be observed in reaction to speed-enforcement warnings. Also, some offenders are partly deterred (i.e., marginal deterrence) while others are not deterred at all (Grasmick & Bryjak, 2001; Watson et al.,