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The effects of non-evaluative feedback on drivers' self-evaluation and performance

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ABSTRACT

Drivers' tend to overestimate their competences, which may result in risk taking behavior. Providing drivers with feedback has been suggested as one of the solutions to overcome drivers' inaccurate self-evaluations. In practice, many tests and driving simulators provide drivers with non-evaluative feedback, which conveys information on the level of performance but not on what caused the performance. Is this type of feedback indeed effective in reducing self-enhancement biases? The current study aimed to investigate the effect of non-evaluative performance feedback on drivers' self-evaluations using a computerized hazard perception test. A between-subjects design was used with one group receiving feedback on performance in the hazard perception test while the other group not receiving any feedback. The results indicated that drivers had a robust self-enhancement bias in their self-evaluations regardless of the presence of performance feedback and that they systematically estimated their performance to be higher than they actually achieved in the test. Furthermore, they devalued the credibility of the test instead of adjusting their self-evaluations in order to cope with the negative feelings following the failure feedback. We discuss the theoretical and practical implications of these counterproductive effects of non-evaluative feedback.

1. Introduction

We are motivated to see ourselves in a positive way in order to feel good about ourselves and to maintain a high self-esteem (Steele, 1988). This applies to drivers as well. Drivers very often believe that they drive better than other drivers or that they are more competent than they actually are, showing a self-enhancement bias in their self-evaluations (see Sundström, 2008). Generally, drivers consider themselves to be more skillful than other drivers (Svenson, 1981; DeJoy, 1989; Delhomme, 1991; Gregersen, 1996; McKenna et al., 1991; Groeger and Grande, 1996), indicating that at least some of them overestimate their skills. Different motivational explanations have been offered for the mechanisms underlying the self-enhancement bias in drivers' skill evaluations. McKenna et al. (1991) suggested that drivers inflate their own abilities instead of deflating those of other drivers. Walton (1999), on the other hand, found that truck drivers downgraded other drivers' abilities rather than inflating their own abilities. Whichever motivational mechanism explains self-enhancement biases, such biases seem to be persistent for driving skills. In fact, this self-enhancement bias has been found to be even stronger when measured implicitly (Harré and Sibley, 2007), suggesting that drivers' beliefs about the superiority of their driving competence are deeply rooted. Paradoxically, people also believed that they are less susceptible to judgmental biases than others (Pronin et al., 2004), which makes these biases even more robust.

The overestimation of skills and competence is associated with perceiving less risks, either by perceiving one's self as a less risky driver (Svenson, 1981) or by perceiving one's own crash risk as lower (DeJoy, 1989; Deery, 1999; Harré and Sibley, 2007). Drivers generally take regulatory actions when they perceive that their competence falls short to meet the demands of the situation (Fuller, 2008). When drivers overestimate their competence, they may expect their performance to be better than it really is. Consequently, when drivers overestimate their skills and underestimate the risks involved, they may be more likely to take risks on the road, for instance, by driving faster. This leaves shorter time margins to detect hazardous situations in time, which in turn may hinder one's ability to respond timely to dangers as to avoid negative consequences. It is therefore of great importance that drivers have accurate estimations of their competence and abilities (see Rothengatter, 2002).

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Kruger and Dunning (1999) suggested that inaccurate self-evaluations of competence, either overestimation or underestimation, is due to lack of metacognition about one's skills and competence. They suggest four possible feedback-related reasons for inaccurate self-evaluations: lack of feedback, attributing failure feedback to some other causes than lack of skills, not understanding why failure occurred, and not receiving self-corrective information. The driving task is subject to all the aforementioned deficiency factors because of the lack of systematic feedback in and the forgiving nature of the traffic environment for errors. Drivers may not develop a realistic representation of their abilities and competence because not every error or violation made while driving results in adverse consequences such as accidents, near accidents, or penalties, which implies that drivers do not receive explicit feedback on their performance. This is particularly problematic for learner and novice drivers because they are more in need of feedback in order to comprehend the effects of their behaviors on other road users, the road environment, what mistakes they do, and how to avoid such mistakes. Feedback from an instructor or from the environment may enable drivers to develop a sense of possible situations that they may encounter in the traffic environment and their abilities or lack thereof to deal with different traffic situations (Groeger, 2000; Kuiken and Twisk, 2001; Hatakka et al., 2002).

Kuiken and Twisk (2001) emphasized the importance of feedback for a safe calibration (i.e. self-regulation) of skills and driving task demands. In line with the self-regulation theory, they propose that adequate self-assessment of skills is crucial for a safe calibration of driving skills. They propose that provision of comprehensive feedback, by providing information on the way the task was performed and how it could be improved, is needed to enhance safe regulation of driving behavior because it enables driver to safely match their capabilities with the task demands. A safe match between the capabilities and task demands reflects on driver's goal setting at various stages of the driving task from route choice to the actions taken behind the wheel (cf. Rothengatter, 2002). Similarly, Hatakka et al. (2002) suggest that self-evaluation of one's driving skills should be integrated in the driver training in order to develop learner drivers' metacognitive skills for specific tasks of driving such as vehicle control or hazard perception, and that this can be realized by providing drivers with feedback on their performance. Such training is expected to promote learner drivers' self-regulatory behaviors in different road situations and task demands (Kuiken and Twisk, 2001; Hatakka et al., 2002). In more and more European countries structured feedback that focuses on higher order safety skills and self-assessment of them are integrated in the driver training as part of the driver licensing systems (Twisk and Stacey, 2007), with promising effects in the short term. Research revealed that after this training, learners assessments of their skills were positively correlated with their trainers' assessments of the same skills, suggesting that learners assessed their skills accurately (Boccara et al., 2011; Mynttinen et al., 2009a,b). The long-term effects of this training have not been studied yet, i.e. it is not clear whether accurate self-assessments observed during the training are retained after the training and whether the training indeed results in less risk taking behavior and accidents.

In the meantime, non-evaluative feedback is increasingly adopted in traffic for training purposes as well. This type of feedback is less comprehensive since typically, information is provided on actual performance levels only. Examples are the increased use of simulators and computer-based tests such as hazard perception tests, which provide non-evaluative feedback on one's driving skills. In essence, people taking these tests learn their absolute scores on a test or their scores relative to other test-takers on particular skills, but do not receive any information on why their score was low or high or on how scores may be improved. Despite being frequently used in driver training we do know little about the effectiveness of non-evaluative performance feedback as given in these instruments.

Research on air traffic control indicates that non-evaluative feedback on performance may be effective in promoting accurate self-evaluations (e.g. Mitchell et al., 1994). Mitchell et al. (1994) used a computerized test to simulate an air traffic controller's task, which is a complex rule-driven task requiring participants to learn various rules about safe and efficient landing conditions. Participants received two sorts of non-evaluative feedback: a running feedback score on their performance after each landing and an overall performance score. Mitchell and colleagues found a strong positive correlation between the expected and actual performance scores of participants, suggesting that participants had an accurate view of their performance. Also, the relationship became stronger at the later trials, suggesting that the feedback enabled participants to further improve their self-evaluations in subsequent trials. Participants used two different strategies of self-regulation, that is, the non-evaluative feedback led to an adjustment of either their actual performance or their expected performance score. This suggests that the non-evaluative feedback resulted in a more accurate self-evaluation of performance, which improved the self-regulation of participants' expected performance throughout the skill acquisition. Could such feedback on performance be beneficial in overcoming the self-enhancement biases for certain driving skills related to drivers' hazard perception as well? Or is non-evaluative feedback not effective or even counterproductive because, for instance, such feedback does not provide any information on how people can improve their performance? In the current research, we will address this question via a hazard perception test.

Hazard perception is a higher-order safety skill which is used to anticipate the road environment and behavior of other road users (Horswill and McKenna, 2004). Specifically, hazard perception skills involve estimating what threats are present in the environment, as well as knowing what to do in order to avoid and handle those threats. Thus, hazard perception skills cover detection and anticipation of threats as well as one's assessment of abilities to handle those threats (Grayson et al., 2003). While hazard perception skills improve as drivers gain experience, hazard perception does not become automated, but rather becomes a less effortful process with practice (McKenna and Farrand, 1999 as cited in Horswill and McKenna, 2004). Therefore, drivers need to pay attention to information from constantly evolving situations and frequently take action in order to handle dangers safely and in time. As we have mentioned earlier, drivers' self-regulatory behaviors to avoid hazards may be influenced by overestimation of their competence. This is particularly the case among novice drivers because their higher order safety skills (such as hazard perception skills) to handle relatively complex traffic situations have probably not sufficiently developed yet (OECD-ECMT, 2006). Accurate self-evaluations in a hazard perception task are particularly important because computerized hazard perception tests are integrated as part of licensing system in several countries including the United Kingdom and the Netherlands. What happens when drivers receive non-evaluative feedback telling them that they are in fact not as good as they think they are, and learn that they are overestimating their competence and performance?

The perceived discrepancy between what drivers actually can do and what they believe they can do is assumed to trigger self-regulatory behaviors (cf. Carver and Scheier, 1998; Fuller, 2008). Specifically, feedback may elicit self-regulation by enabling a comparison between the expected and actual situation, and consequently making people aware of any discrepancy or balance between the expected and actual situation (Cervone and Wood, 1995; Carver and Scheier, 1998). An adaptive response to deal with a discrepancy would be to adjust the effort put in the task and try