



Seemingly irrational driving behavior model: The effect of habit strength and anticipated affective reactions



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ABSTRACT

An increasing amount of evidence suggests that aberrant driving behaviors are not entirely rational. On the basis of the dual-process theory, this study postulates that drivers may learn to perform irrational aberrant driving behaviors, and these behaviors could be derived either from a deliberate or an intuitive decision-making approach. Accordingly, a seemingly irrational driving behavior model is proposed; in this model, the theory of planned behavior (TPB) was adopted to represent the deliberate decision-making mechanism, and habit strength was incorporated to reflect the intuitive decision process. A multiple trivariate mediation structure was designed to reflect the process through which driving behaviors are learned. Anticipated affective reactions (AARs) were further included to examine the effect of affect on aberrant driving behaviors. Considering the example of speeding behaviors, this study developed scales and conducted a two-wave survey of students in two departments at a university in Northern Taiwan. The analysis results show that habit strength consists of multiple aspects, and frequency of past behavior cannot be a complete repository for accumulating habit strength. Habit strength appeared to be a crucial mediator between intention antecedents (e.g., attitude) and the intention itself. Including habit strength in the TPB model enhanced the explained variance of speeding intention by 26.7%. In addition, AARs were different from attitudes; particularly, young drivers tended to perform speeding behaviors to reduce negative feelings such as regret. The proposed model provides an effective alternative approach for investigating aberrant driving behaviors; corresponding countermeasures are discussed.

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1. Introduction

Reducing aberrant driving behaviors is essential for lowering the incidence of traffic accidents and fatalities. A significant correlation between traffic violations and fatalities has been found in car and motorcycle drivers and in different age and gender groups (Waller et al., 2001; Chang and Yeh, 2007). Among traffic violations, speeding frequently results in fatalities if a crash occurs. The National Highway Traffic Safety Administration of the United States determined that more than 30% of all traffic fatalities involve speeding behaviors (NHTSA, 2013).

An increasing amount of evidence suggests that decisions regarding speeding behaviors are not entirely rational. Peer (2011) showed that drivers may drive at high speeds because they overestimate the time saved by increasing their speed; this biased judgment of time saving is caused by heuristic thinking and is

particularly salient when time constraints exist in a trip (Peer and Rosenbloom, 2013). Drivers also tend to exceed the speed limit if they perceive the limit as irrationally low. The speed limit may be a rational design (e.g., based on road geometry), and noncompliance is a person's irrational choice, or the speed limit may have been set because of political reasons, and the choice to speed is rational (Mannering, 2009). The decision to speed may also be influenced by the perception of penalty rules. Drivers tend to overestimate the probability of being caught for speeding and underestimate the number of kilometers that they can drive over the speed limit before losing their driving license (Jørgensen and Pedersen, 2005).

Contributing to the findings of previous studies, this study elucidated speeding behaviors by investigating two factors: habit strength and emotional arousal. Habit strength, despite having been considered in previous studies, has been frequently regarded as an isolated antecedent of speeding intention (e.g., De Pelsmacker and Janssens, 2007); in other words, no causal relationship exists between habit strength and other antecedents of speeding intention. This implies that the formation of habit strength is independent of speeding behavior. This assumption is inconsistent with the basic definition of habit—frequent repetition

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of a behavior. In addition, excluding habit strength from the formation of speeding behavior causes difficulties in understanding how a speeding habit is associated with the investigated behavior. On the basis of the habit acquisition principles of Wood and Neal (2007), this study proposes a multiple trivariate structure that includes habit strength in the theory of planned behavior (TPB) model. In addition, the habit strength measured in the current study was not the frequency of past behaviors, as in many previous studies. This study developed a self-report habit index (SRHI) of speeding behaviors based on Verplanken and Orbell (2003) to reflect the multiple aspects of habit strength, such as automaticity and self-identity, in addition to repetition.

This study also investigated the effect of emotional arousal on speeding behaviors by adding affective attitude and anticipated affective reactions (AARs) to the TPB model; these two factors respectively represent drivers' affective evaluations regarding speeding behavior and the consequences of the speeding behavior. Affective attitude has recently become prevalent in behavioral studies to account for the role of affect; several studies have described its strength in predicting intention. AAR is another form of attitude but is rarely adopted in behavioral studies. AAR is a crucial factor for an aberrant driving behavior model because behavior and the possible consequences of the behavior, such as time saved, penalty tickets, injuries, and fatalities, concern drivers.

This study proposes a seemingly irrational driving behavior model to investigate how habit strength and emotional arousal affect speeding behavior. This novel model was developed on the basis of a dual-process theory, in which two paths coexist to determine the behavior of interest (i.e., one path passes through deliberate processes and the second passes through heuristic processes). This heuristic process was designed on the basis of how habits are acquired, accounting for the learned nature of driving behaviors and providing crucial information for intervention. Scales were developed and empirical data were collected and analyzed to examine the proposed model.

The remainder of this article is organized as follows: Section 2 introduces the proposed seemingly irrational speeding behavior model and presents the rationale behind the development of the model; Section 3 provides the methodology, including the design and development of the scales, survey plan, and analysis procedures; Section 4 presents the analytic results; Section 5 provides a discussion of the findings; and Section 6 explains the study limitations and proposes recommendations for future studies.

2. Proposed seemingly irrational driving behavior model

Prior studies have suggested that speeding behaviors, similar to other behaviors, contain deliberate and heuristic as well as cognitive and affective decision processes; irrational speeding behaviors may partially result from nondeliberate or affective decision-making processes. Accordingly, this work proposes a seemingly irrational driving behavior model based on the dual-process theory. The theory consists of two systems: System 1 (or intuitive inferences) refers to an implicit and unconscious process, whereas System 2 (or reflective inferences) refers to an explicit and conscious process. This section first introduces the model designed for the reflective inferences, followed by the model designed for the intuitive inferences. Subsequently, how the effect of emotional arousal is incorporated into the proposed model is presented.

2.1. Reflective inferences: theory of planned behavior

This study modeled the explicit and conscious decision process of speeding behaviors on the basis of the TPB. The TPB has been frequently applied to examine human behaviors. Several studies

have shown that the TPB is a powerful theory for explaining aberrant driving behaviors, including speeding (Horvath et al., 2012; Leandro, 2012). The theory assumes that people perform a behavior if they intend to do so, and the intention is determined by three factors: attitude toward the behavior, subjective norms, and perceived behavioral control (PBC).

According to Fishbein and Ajzen (2010), attitude toward the behavior refers to the degree to which performing the behavior is positively or negatively valued. The term subjective norm is defined as the perceived social pressure to perform or not perform a given behavior. There are two types of subjective norms, namely injunctive and descriptive norms. The term injunctive norm refers to the perceptions of the members of a certain group (i.e., salient referents) regarding whether a certain behavior should be performed, and descriptive norm refers to perceptions regarding whether the salient referents performed a certain behavior. Finally, PBC refers to people's perception of their ability to perform a certain behavior and is also divided into two types: capacity and autonomy. Fishbein and Ajzen (2010) suggested that these two types of PBC are hierarchical; capacity is primarily the perceived ability to perform or not perform a certain behavior, whereas autonomy is mainly the perceived degree of control over performing the behavior.

On the basis of the aforementioned reasoning, this study proposed the following TPB hypotheses:

H1a. Positive attitudes toward speeding behaviors positively influence speeding intention.

H1b. Social norms regarding the nonperformance of speeding behaviors negatively influence speeding intention.

H1c. PBC over performing speeding behaviors positively influences speeding intention.

2.2. Intuitive inferences: principles of habit acquisition

The TPB is recognized as a particularly useful model for explaining rational behaviors, in part because of its predecessor, the theory of reasoned action. However, Fishbein and Ajzen (2010) and Ajzen (2011) have argued that the TPB does not assume that the measured intentions are derived from having sufficient time or information for making decisions, and thus the TPB should be capable of explaining various behaviors in addition to rational behaviors. Reyna and Brainerd (1995) suggested that there are three types of decision-making behaviors: deliberate, intuitive, and reactive behaviors. The TPB, especially the attitude factor, is apparently effective for explaining deliberate behaviors (i.e., calculating the social price for having made a particular decision). The subjective norms factor may partially explain reactive behaviors (i.e., following the majority without thinking); however, it is difficult to determine which part of the TPB explains intuitive behaviors. This difficulty may explain why the TPB explains intentions or behaviors to only a limited extent (Fishbein and Ajzen, 2010).

Recognizing that driving is a learned behavior, an increasing number of studies on traffic safety have incorporated habit strength into their designs. De Pelsmacker and Janssens (2007) added habit formation to the TPB to investigate speeding behaviors in the Belgian population; the habit was measured using a three-item scale comprising self-report measures. Forward (2009) used past behavior to measure the habit strength of traffic violations and examined its association with the traffic violations of speeding and overtaking. Brijs et al. (2011) incorporated habit and past behavior as two separate factors and investigated whether seatbelt

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