UNDERSTANDING DRIVER ANGER AND AGGRESSION: ATTRIBUTIONAL THEORY IN THE DRIVING ENVIRONMENT

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by

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Abstract

The purpose of the current study was to provide the first comprehensive examination of the applicability of Weiner's (1995, 1996) attributional model of social conduct to the roadway environment. Study 1 adopted a written scenario methodology where participants were asked to imagine themselves driving on a major highway. The vignette described another driver who cuts in front of the participant causing him or her to brake suddenly. The degree of Controllability and Intentionality of the driving act was experimentally manipulated by altering the specific event-related details provided to the participants. Study 2 adopted a diary study methodology, whereby participants completed on-line driving diaries every two days identifying their most negative/upsetting encounter with another motorist. After completing four diaries, the most anger-provoking event from the diary entries was selected and participants were asked to respond to a questionnaire similar to that used in Study 1. Path analyses in both studies generally demonstrated the hypothesized relationships proposed by Weiner's model and confirmed the fit of the model to the data. Study 2 demonstrated that the model provided a good means of classifying a diversity of offensive driver behaviours, even in the presence of many uncontrolled real-world variables. The results of these studies have significant implications for research into driving-related stereotypes, the role of individual difference variables in driver anger and aggression, and the potential influence of cognitive load on driver behaviour. As well, the research findings provide several recommendations for improved driver safety including the development of attributional retraining programs,

teaching novice drivers about both formal and informal roadway communication, and the promotion of forgiveness in the driving environment.

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Driver Anger and Aggression

The driving environment is a hotbed of potential conflict. It is a place where thousands of individuals must cooperate and negotiate with each other in order to arrive safely at their destinations. Although most drivers usually manage to navigate their route without incident, thousands of collisions or near-collisions occur each and every day (Ontario Ministry of Transportation, 2005). In the case of an actual collision, the consequences are significant not only to the individual drivers involved but also to society at large.

According to the United States' National Highway Traffic Safety Administration ([NHTSA] 2008), there were more than 6 million police-reported motor vehicle crashes in 2007, which led to nearly 2.5 million injuries and more than 41,000 casualties. According to the latter figure, 112 Americans were killed in motor vehicle collisions each day, one every 13 minutes. In Canada, injuries from motor vehicle collisions represent the tenth leading cause of death (Stein, 1997). The economic cost of motor vehicle collisions is astronomical. According to NHTSA, the economic cost associated with motor vehicle crashes in 2000 was estimated to be over $230 billion (NHTSA, 2008). In 1995, motor vehicle crashes cost Canadians almost $1.7 billion in direct healthcare costs and indirect costs generated by permanent disability (Smartrisk, 1998).

One of the primary contributing factors to motor vehicle collisions is aggressive driving behaviour (Lawton, Parker, Stradling, & Manstead, 1997; Mann et al., 2007; Matthews, Tsuda, Xin, & Ozeki, 1999; Meadows, Stradling, & Lawson, 1998; Mesken, Lajunen, & Summala, 2002; Parker, Reason, Manstead, & Stradling, 1995; Parker, West, Stradling, & Manstead, 1995; Wells-Parker et al., 2002; Xie & Parker, 2002), which includes various dangerous driving actions such as tailgating, cutting off other vehicles, and speeding. According to statements given at the U.S. Congress at a hearing of the Committee on Transportation and Infrastructure in 1997, aggressive driving was estimated to be involved in 50% of all motor vehicle collisions (Snyder, 1997). According to the testimony given by the head of NHTSA, aggressive driving contributed to one third of all personal injuries and two thirds of all fatalities resulting from motor vehicle crashes (Martinez, 1997).

Aggressive driving behaviour and its potential causes have received significant attention in the scientific literature. Although factors internal to the aggressive driver himself or herself have been found to contribute to aggressive driving behaviour, including many facets of personality (Bone & Mowen, 2006; Lajunen & Parker, 2001; Lawton et al., 1997; Matthews, Dorn, & Glendon, 1991), mood (Arnett, Offer, & Fine, 1997; Groeger, 1997; Novaco, 1991), and the experience of stress (Hennessy & Wiesenthal, 1999, 2001a; Lowenstein, 1997; Simon & Corbett, 1996) to name a few, there is often a precipitating driving event that elicits aggressive behaviour. Every motorist must share the road with thousands of other drivers. Every motorist must somehow communicate his or her own intended manoeuvres to other road users, and

must anticipate and interpret the manoeuvres of those other road users as well. With so much ongoing interpretation of others' behaviours and so much at stake in terms of health and financial costs, it is no surprise that much of the aggressive driving behaviour seen on the roadways is the result of driver anger and retaliation for a perceived driving offence (Gulian, Debney, Glendon, Davies, & Matthews, 1989; Hennessy & Wiesenthal, 2001b, 2002a, 2002b, 2004, 2005; Lupton, 2002; Neighbors, Vietor, & Knee, 2002; Parker, Lajunen, & Stradling, 1998; Parker, Lajunen, & Summala, 2002; Rothe, 2008; Shinar, 1998).

Driver anger is experienced by motorists with great frequency. In fact, anger is more likely to be experienced when driving than when engaged in other everyday activities (Parkinson, 2001). Underwood, Chapman, Wright, and Crundall (1999) attempted to estimate the frequency and causes of driver anger. They equipped drivers with microcassette recorders and asked them to record a diary entry after every car journey taken over a two-week period. Approximately 85% of the participants reported experiencing anger at least once during the two-week period, and overall, drivers expressed anger in about one fifth of all trips taken. In a similar diary study completed over a ten-day period, Neighbors et al. (2002) found that drivers reported incidents of driver anger on slightly more than a daily basis. The anger only lasted a few minutes but was reported as being relatively intense. Mesken, Hagenzieker, Rothengatter, and de Waard (2007) conducted a study in which participants drove an instrumented car and verbally reported their emotions to the passenger experimenter. During the 50-minute experiment, anger was reported an average of 1.5 times. In all of these studies, driver

anger was associated with the actions of another motorist. In the study by Underwood et al., 37% of reported anger occurred immediately following a near collision. In the participant diaries of the Neighbors et al. study, 59.1% of anger events were classified as resulting from the discourtesy of other drivers and 43.5% were classified as resulting from dangerous driving by other motorists. In the study by Mesken et al., anger was associated with impeded progress or safety-related events, which were perceived to be the fault of another driver.

Driver anger can be elicited by a wide variety of offensive behaviours. In a nationwide survey of members of the Canadian Automobile Association (CAA) in 2000, 47% of drivers had been victims of aggressive driving. The most commonly reported behaviours were obscene gestures, being cut off in traffic, and being tailgated (as cited in Herzog, 2005). According to the Ontario Provincial Police (OPP), Ontario drivers submit up to five hundred telephone complaints each week concerning the behaviour of other motorists (Mitchell, 1997). A review of the 14,406 complaints received by the OPP in 2000 revealed that the most commonly reported driver behaviours were dangerous lane usage (e.g., shoulder running, cutting off another driver), speeding, and tailgating (Wickens, Wiesenthal, & Rippey, 2005). Parker et al. (2002) adopted a slightly different approach in examining this question. They asked participants in Britain, Finland, and the Netherlands to review an extensive list of offensive behaviours and to indicate how angry they would be if they were confronted with this situation. The most anger-provoking behaviours included another driver taking a parking spot that you had been waiting for, having someone drive behind you at night with their highbeams on, being tailgated, and

having another motorist speed up as you try to pass them. Generally speaking, the most anger-provoking behaviours were the same across all three cultures. Tay (2007) confirmed that this same class of discourteous behaviours were perceived as the most anger-provoking in Canada, and noted similar results from other researchers for the United States and Australia.

There is already significant evidence that anger can contribute to aggressive behaviour (e.g., Deffenbacher, Deffenbacher, Lynch, & Richards, 2003; Deffenbacher, Filetti, Richards, Lynch, & Oetting, 2003; Deffenbacher, Huff, Lynch, Oetting, & Salvatore, 2000; Deffenbacher, Lynch, Filetti, Dahlen, & Oetting, 2003; Deffenbacher, Lynch, Oetting, & Yingling, 2001; Deffenbacher, Richards, Filetti, & Lynch, 2005; Dukes, Clayton, Jenkins, Miller, & Rodgers, 2001; Galovski & Blanchard, 2002; Malta et al., 2001; Malta, Blanchard, & Freidenberg, 2005). In the study by Parker et al. (2002), participants were also asked to indicate their likely response for each anger-provoking situation from a list of possible reactions ranging from "doing nothing" to "getting out of your car, prepared to engage physically with the other driver". Although extremely violent responses were less common, participants did indicate some intent to engage in various aggressive responses such as gesturing or swearing at the other motorist. In the diary study by Neighbors et al. (2002), drivers were asked to report their own aggressive driving in response to anger-provoking events. Becoming angry was virtually always associated with some type of behavioural response, and the majority of those anger-provoking events resulted in more than one aggressive action. The most common aggressive reactions were muttering comments (53.5%), name calling (28.8%), yelling

(28.1%), and gesturing (24%), but also included tailgating (15.1%), tapping or hitting brakes (14.6%), and refusing lane access to the other driver (6.7%). A recent meta-analysis by Nesbit, Conger, and Conger (2007) also provided strong support for the anger-aggression relationship in the driving environment. In their assessment of 25 published articles that included 28 independent studies, there was an average correlation of .40 between anger and aggressive driving.

Given the frequency of retaliatory aggressive driving behaviour and the significant costs in terms of casualties and economic losses, it behoves us to examine this phenomenon more closely. What features of a given driving behaviour or situation make it anger-provoking and allow it to elicit an aggressive response? Theories of attribution may provide some insight.

Theories of Attribution and Driving

In their broadest sense, theories of attribution depict the general process by which individuals explain the events around them, traditionally focusing on perceived causality of behaviours and events (Fincham & Jaspars, 1980). These theories have provided highly similar yet distinct explanations for the process of attribution (e.g., Heider, 1944, 1958; Jones & Davis, 1965; Kelley, 1967), and have identified numerous constructs relevant to the process. As these theories have been developed and advanced over the past half century, they have been extended to include subsequent emotions and behaviours resulting from the attributions made (e.g., Feather, 1996, 1999; Fincham & Roberts, 1985; Fincham & Shultz, 1981; Shaver, 1985; Shultz & Darley, 1991; Shultz & Wright, 1985).

Defensive Attribution

Although attribution theory has been applied to the driving context for decades, the earliest applications were more interested in the development of attribution theory than in its application to any particular context. In fact, the earliest applications of attribution theory to the driving context were really a matter of convenience for attribution theorists. In the mid-1960s, one of the primary research questions for attribution theorists involved defensive attribution, a theoretical position regarding the role of self-protective motives in the attribution of responsibility for an accident.

According to Walster (1966), when we learn of an accident that has severe consequences, we want to believe that the accidental event is controllable in nature so that it can be avoided and so that we ourselves do not fall prey to it in the future. As a result of this motivation, the severity of an accident affects our judgment of responsibility for that accident. Specifically, when judging responsibility for accidents with mild consequences, it is easier to recognize that some accidents happen through no fault of our own. Yet, when judging responsibility for accidents with severe consequences, our need to feel safe and secure motivates us to hold the victim responsible. As long as we assure ourselves that we are different than the victim of that severe accident or that we would have behaved differently in the same circumstances, then blaming the victim for the severe accident satisfies our need to feel safe. Although defensive attribution was examined using many different types of accidents including industrial accidents (Kouabenan, Gilbert, Médina, & Bouzon, 2001), chemistry lab errors (Shaw & Skolnick, 1971), and even financial loss resulting from a real estate purchase (Walster, 1967),

perhaps the most common research paradigm used to study this phenomenon involved the examination of vehicle collisions (Arkkelin, Oakley, & Mynatt, 1979; McKillip & Posavac, 1975; Phares & Wilson, 1972; Shaver, 1970a, 1970b; Shaw & McMartin, 1975; Walster, 1966). Motor vehicle collisions were highly relevant to the majority of potential participants, and thus were easy for participants to imagine. In addition, vehicle collisions possessed two necessary features required by defensive attribution research: multiple plausible sources of causation and a broad range of possible consequences. For these reasons, early attribution theorists who were engaged in the hotly contested debate concerning defensive attribution often examined their theories in the context of the driving environment. The debate over defensive attribution raged throughout the 1960s and 1970s. Finally in 1981, Burger conducted a meta-analysis of the phenomenon and found weak support for it, although much stronger support was found when research paradigms considered personal and situational similarity between the observer and the collision perpetrator or victim. Robbennolt (2000) conducted a more extensive meta-analysis and found similar results, but noted that the strength of the relationship varied with the nature of the judgment being made (e.g., responsibility, blame, liability, damages, etc.), the presentation medium of the study (i.e., audio or video presentation seemed to produce a stronger effect size than written vignettes), and type of participant (i.e., a stronger effect was found with adult participants than student participants).

Fundamental Attribution Error

Identification of the fundamental attribution error and the actor-observer effect in the driving context emerged in part from the defensive attribution studies but also from

other early applications of attribution theory to driving. The fundamental attribution error reflects our tendency to overvalue dispositional explanations and to undervalue situational explanations for the negative behaviour of *others*. The actor-observer effect is an extension of this attributional bias that reflects our tendency to overvalue situational explanations when interpreting our *own* errors and negative behaviours (Jones & Nisbett, 1972; Kelley, 1967; Kelley & Michela, 1980).

In studying accident causation and the defensive attribution error in terms of motor vehicles, there was an overall tendency of participants to attend to causal cues over which the driver had control or to otherwise favour explanations for the collision that blamed the victim (e.g., Arkkelin et al., 1979; Moyano-Díaz, 1997). In one study of defensive attribution, participants were asked to list what information they would need in order to make a judgment of responsibility. A greater number of participants requested person-oriented over environment-oriented information (Shaw & McMartin, 1975). Brickman, Ryan, and Wortman (1975) were interested in the relative strength of internal versus external causes in affecting attributions for various types of motor vehicle collisions. As expected, implied internal causes led to internal attributions and implied external causes led to external attributions; but interestingly the internal causes had stronger effects overall. As research into driver safety continued, it was quickly recognized that judgments of other drivers were often based on perceptions of personality, temperament, motivation, and values that had been inferred from more observable characteristics or behaviours (Knapper & Cropley, 1980, 1981). This presumed bias is also reflected at a societal level in the media depiction of driver safety

issues such as driver aggression. Burns and Katovich (2003) conducted a content analysis of newspaper articles from three major American publications between May, 1985 and May, 1999. They included all articles containing the terms 'road rage' or 'aggressive driving', and examined the causes for these occurrences noted in the published articles. Results indicated that newspaper coverage of driver aggression identified human behaviour as the primary cause of roadway violence. Specifically, 72% of the causes of driver aggression noted in newspaper publications were attributed to human factors (e.g., driver behaviour, culture, human nature, stress, mental problems, etc.). Only 28% of the causes cited for driver aggression were related to environmental factors (e.g., traffic congestion, poor engineering and road design).

Actor-Observer Effect

Although many studies have examined the attribution biases in regards to another driver, few studies have concurrently compared attributions for other versus self. Yet, there are strong reasons why the actor-observer effect might be expected to be found in the driving environment. Essentially, driving involves those conditions which are necessary in order for the actor-observer effect to emerge (Harré, Brandt, & Houkamau, 2004; Hennessy & Jakubowski, 2007; Herzog, 1994). First, the visual orientation of the actor-driver differs from the observer-driver. Specifically, the actor-driver is focused on the environmental setting whereas the observer-driver is focused on the actor-driver's behaviour. The visual orientation represents what is perceptually salient for each driver and hence what is the basis for their attributions. Second, the level of knowledge available to each driver is entirely different. The actor-driver has extensive knowledge of

his or her own driving history and mental state, meaning that a driver with a good driving record who encounters an unusual circumstance on the roadway can attribute his or her own negative driving behaviour to a more situational and fleeting cause. The observer-driver, on the other hand, does not have access to these mitigating facts and must rely only on the witnessed event. Finally, the driving environment is fast-paced and visually isolating. It creates a great degree of anonymity and hence significantly restricts communication. This situation virtually ensures that the observer-driver's attribution must be based solely on the witnessed behaviour without the benefit of additional considerations.

One of the initial studies of the actor-observer effect in the driving environment (Baxter, Macrae, Manstead, Stradling, & Parker, 1990) used two written scenarios depicting typical driving events (i.e., tailgating and running a red traffic light). For both events, the perpetrator was described as being the participant himself or herself or someone of the same age and sex as the participant. After reading one of the scenarios, participants were asked to rate four potential causes of the driving event, two of which were dispositional in nature and two of which were situational in nature. Results indicated that participants in the 'self' group preferred situational to dispositional explanations, whereas there was no difference for those in the 'other' group.

Since the initial research by Baxter et al. (1990), a few other researchers have also had success in finding the actor-observer effect in the driving environment. Herzog (1994) presented participants with three videotaped driving interactions. The videotapes presented the driving interactions from one of three perspectives: (a) the actor's

perspective (i.e., the offending driver), (b) the active observer's perspective (i.e., a driver who was inconvenienced by the driving offence), and (c) the passive observer's perspective (i.e., a pedestrian who was not involved in the event). As expected, the actor-observer divergence in attributions made for the offending driver's behaviour did emerge in two of the three driving scenarios. Moreover, dispositional attributions were rated higher by active observers than by passive observers.

Harré et al. (2004) asked high school students to rate the frequency of their own risky driving and that of their friends, and then to list reasons why they and their friends engaged in such behaviour. Students reported that their friends engaged in risky driving behaviour more frequently than did they themselves. Moreover, after coding the reasons for risky driving given by the students, the researchers found that "showing off, acting cool" was listed four times more often for the risky driving of friends than for that of oneself. On the contrary, "in a hurry, late" was used more often to explain one's own risky driving than that of others. Although all of the results were in the expected direction, only the attributions made for the risky driving behaviour of others (not for one's own behaviour) were statistically significant.

Finally, Hennessy and Jakubowski (2007) used a new tool to study the actor-observer effect in the driving context. The authors used a commercially available video game to create a driving scenario that could be viewed from either the driver's perspective or the perspective of a trailing motorist. In the scenario that was developed, the offending driver travelled at the posted speed limit without incident for approximately one minute. The driver then partially crossed over the centre line into the path of an

oncoming van, causing a near collision. Afterward, the driver continued on without incident for another minute. Participants were asked to rate the riskiness of the offending driver and to rate the van driver's responsibility for the near collision. As expected, participants who viewed the scenario from the perspective of the trailing motorist rated the offending driver as more risky and assigned less blame to the van driver than did those participants who viewed the scenario from the perspective of the offending driver.

Extended Attributional Theory

As mentioned previously, advancements in attribution theory have allowed the research focus to shift from factors that affect the nature of attributions and responsibility judgments to the emotions and behaviours resulting from those attributions and responsibility judgments (e.g., Feather, 1996, 1999; Fincham & Roberts, 1985; Fincham & Shultz, 1981; Shaver, 1985; Shultz & Darley, 1991; Shultz & Wright, 1985). These developments in attribution theory have begun to make their way into the driving literature. Knapper and Cropley (1978, 1981) recognized early on that imputed inferences and perceptions about offensive drivers were primary determinants of affective and behavioural responses. Yagil (2001) attempted to examine the impact that attributions concerning the driver's motivation for offensive behaviour might have on the victim's behavioural responses. Perhaps because this was a new type of research inquiry for driving theorists, Yagil did not incorporate a developed attributional theory or measure into the research design (Britt & Garrity, 2006). Instead, she presented participants with various written driving scenarios and then asked participants to rate two possible causes for the driver's behaviour: a hostile and a non-hostile cause. Unfortunately, the hostile

versus non-hostile dichotomy may have been problematic, as both attributional options presented to participants were often internal or dispositional types of attributions and portrayed the offending driver in a negative light. This methodological detail may be why hostile attributions failed to predict aggressive reactions in this study. Nonetheless, Yagil's work represents an important preliminary step in the application of attribution to the driving literature.

Feather and Deverson (2000) examined the impact of responsibility judgments on feelings related to punishment. Using written scenarios about a motor vehicle collision, Feather and Deverson experimentally manipulated the gender of the offending driver, the presence or absence of mitigating circumstances (e.g., inclement weather, driver travelling at a high rate of speed), and the moral worth of the offending motorist (i.e., describing the driver as either trustworthy and dependable or not). Given the unrealistic amount of knowledge about the offending driver given to the participant by the latter manipulation, the generalizability of the findings to drivers in the real world must be questioned, although it is possible that drivers in the real world often infer the moral worth of offending motorists. Each written scenario finished with the same sentence being handed down by the courts. After reading one of the eight scenarios, participants were asked to rate the responsibility of the offender for the penalty he or she received, the extent to which the driver deserved the punishment given, the seriousness of the offence, the harshness of the penalty, the moral character of the offending motorist, sympathy for the driver, and positive affect about the penalty. The authors developed two path analysis models to explain the relationships between these variables. The more interesting part of

these models was that perceived responsibility for the sentence received (and presumably for the collision itself) was related to the deservingness of the penalty and the perceived harshness of the penalty, which led to affective reactions toward the offender and his or her penalty. Ultimately, this study demonstrated that judgments of responsibility in the driving context can, in turn, impact subsequent cognitions and emotions. Furthermore, Feather and Deverson noted the importance of including these constructs when examining the role that responsibility might play in predicting other affective reactions.

Perhaps the most structured application of attribution theory to the driving environment was a research study conducted by Britt and Garrity (2006). These researchers asked participants to recall a time when they had experienced a specific anger-provoking event when driving. The events included being tailgated despite travelling at a decent rate of speed, being cut off and forced to brake, and being stuck behind a driver travelling very slowly in the passing lane of the highway. Participants were asked to respond to a series of questions regarding their attributions, emotions, and behaviours in response to each event. The attributional items were taken from Fincham and Bradbury's (1992) model and included causal attributions of locus (i.e., the cause rests with something about the actor), stability (the cause for the actor's behaviour is not likely to change in the future), and globality (the reason for the actor's behaviour pervades across other areas of his or her life). In addition, attributions of blame and hostility were also included. The emotional items focused on worry and anger, although worry was rarely reported by participants in the study. The aggressive response items included making an obscene gesture, yelling or cursing at the driver, giving the driver a

dirty look or stare, and honking the horn. Results indicated that reported anger and aggressive behaviour were greatest for the cut-off scenario.

In order to assess the impact of attribution on anger and aggression, Britt and Garrity (2006) conducted a series of six regression analyses using all five types of attribution as independent variables and predicting anger and aggressive behaviour in each driving scenario. In the tailgating scenario, stability and blame attributions were significant predictors of both anger and aggressive behaviour, such that attributing the event to a stable cause in the offending driver and assigning blame for the event to the driver resulted in increased anger and aggressive behaviour in response to the event. In the cut-off scenario, stability attributions significantly predicted both anger and aggressive behaviour, and hostile attributions also predicted anger. Finally, in the slow driver scenario, anger and aggressive behaviour were both significantly predicted by stability and hostile attributions. Overall, stability was the most effective causal dimension in the analysis as it was a significant predictor of anger and aggression in all driving scenarios. Locus and globality did not significantly predict anger or aggressive behaviour in any of the scenarios. Blame attributions were important for the tailgating scenario, whereas hostile attributions played a role in the cut-off and slow driver scenarios. Taken as a whole, these results highlight the importance of attributional theory to the study of driver anger and aggression, and they lay the groundwork for further empirical study.

The Current Study

The next logical stage of research in the application of attribution theory to the driving environment is the examination of a full attributional model. Thus far, researchers have focused on various components of these extended models including examinations of how various factors influence causal attributions and judgments of responsibility (e.g., Arkkelin et al., 1979; McKillip & Posavac, 1975; Shaw & McMartin, 1975), how these causal attributions and responsibility judgments predict emotion (e.g., Britt & Garrity, 2006; Feather & Deverson, 2000), and aggressive behaviour (e.g., Britt & Garrity, 2006; Yagil, 2001), and how anger is a necessary precursor to aggression (e.g., Neighbors et al., 2002; Nesbit et al., 2007; Parker et al., 2002). Yet, there has been very little research that has assessed how all of these components work together in the context of driving.

One attributional model that might be particularly applicable to the driving context is Weiner's (1995, 1996) attributional theory of social conduct. This model has been applied to a variety of behavioural and situational domains including achievement evaluation (Weiner 1979, 1985; Weiner & Kukla, 1970), interpersonal transgressions (Struthers, Eaton, Czyznielewski, & Dupuis, 2005; Struthers, Miller, Boudens, & Briggs, 2001), reactions to stigmatized persons (Weiner, Perry, & Magnusson, 1988), helping behaviour (Barnes, Ickes, & Kidd, 1979; Marjanovic, Greenglass, Struthers, & Faye, in press; Piliavin, Rodin, & Piliavin, 1969), and retaliatory aggression (Betancourt & Blair, 1992). Although several different versions of the theory have been postulated, each varying in the specific constructs or paths included in the model, the general theory posits that the full attribution process includes cognitive, affective, and behavioural

components. The cognitive elements are described as determinants of affective responses, while affective responses are depicted as determinants of behavioural responses.

In the case of an individual who experiences a personal transgression, the victim will seek to determine the cause of that infraction. Within the cognitive stage of the process, the victim will assess various dimensions of the perceived cause of the transgression which will form the basis for a judgment of the transgressor's responsibility for the harmful act. Weiner (1979, 1985, 1995, 1996) has identified several causal dimensions including controllability, intentionality, locus of causality, stability, and globality. In applying the theory to a specific content domain, most researchers have focused on a subset of only two or three of these dimensions. Controllability of the event addresses whether the harmful act was under the transgressor's power or control or whether it was a preventable event. Intentionality speaks to whether or not the transgressor's actions were deliberate or inadvertent. Locus of causality is adapted from the early works of Rotter (1966) and Heider (1958), and reflects whether the harmful act was caused by something internal versus external to the transgressor. The stability dimension defines the cause as variant or invariant over time. Finally, the globality dimension is similar to stability; however, where stability examines temporal generalization, globality examines stimulus generalization. Using these dimensions, the victim will make a judgment of responsibility. Greater perceptions of controllability, intentionality, stability, and globality, and a stronger perception of internal or dispositional locus of causality will lead the victim to judge the transgressor as responsible for the harmful act.

In the affective stage of the attribution process, a judgment of responsibility will evoke feelings of anger, whereas a judgment of minimal responsibility will evoke feelings of sympathy or concern for the transgressor. In the behaviour stage of the process, anger can motivate an aggressive reaction to the harmful act, whereas sympathy or concern can motivate a prosocial or helping behaviour. In addition, Weiner's model has also been extended to include an inhibitory process whereby anger can inhibit prosocial or helping behaviour, and sympathy can inhibit aggressive behaviour; however, this secondary process will not be assessed in the current study. All of the primary relationships between constructs across the three stages of this attributional model are presented in Figure 1.

The judgment of responsibility and resulting emotions have not always been central components of Weiner's model (1996). In the earliest applications of the model to achievement motivation and the judgment of stigmatized persons, causal dimensionality directly predicted prescribed punishment and helping behaviour (e.g., Weiner & Kukla, 1970; Weiner et al., 1988). However, in the subsequent applications of this model to aggression, a clear theoretical distinction was drawn between causal dimensionality and responsibility judgments. Specifically, causal dimensionality was described as an antecedent of the more encompassing inference of personal responsibility (Weiner, 1996). Weiner (1996) has since also noted that judgments of responsibility leading to behavioural reprimand are consistent with several utilitarian principles of punishment including: (a) reform, discouraging the transgressor from engaging in the negative behaviour again; (b) general deterrence, discouraging others from engaging in similar

negative behaviour; and (c) moral education, educating society about what is good versus bad behaviour. In terms of the introduction of emotion to the model, results from several researchers (e.g., Averill, 1983; Ferguson & Rule, 1983; Weiner, Graham, & Chandler, 1982) emphasized the experience of anger in response to experimentally manipulated or self-report correlational studies of negative causal dimensionality, suggesting that an affective component should be added to the theory (Weiner, 1996). Although Weiner (1995, 1996) has acknowledged that there may be situational domains where responsibility does not play as important a role as it does in other contexts, both the judgment of responsibility and the affective component have since been incorporated into the overall attributional theory of social conduct.

This model may be particularly applicable to the driving context as it has been successfully applied to other contexts involving aggressive behaviour (Betancourt & Blair, 1992; Nickel, 1974). In fact, a reduced version of this model that focused exclusively on intentionality and excluded the responsibility judgment has been successfully applied to the driving context using a scenario-based self-report study (Vallières, Bergeron, & Vallerand, 2005). Another benefit of Weiner's (1995, 1996) model is that it includes a broad and systematic approach to understanding the nature of causal attributions, which may be an important strength when trying to account for the many different types of offensive driver behaviour. Furthermore, the model provides a means to account for positive emotions and behaviours on the roadway. Although these types of encounters may be few and far between, the model could potentially explain these events and provide a means of developing a way to increase their frequency.

The purpose of the current study was to provide the first comprehensive examination of the applicability of Weiner's (1995, 1996) attributional model of social conduct to the roadway environment. Study 1 adopted a laboratory-based methodology, whereas Study 2 was designed to examine the model in the context of an actual anger-provoking driver altercation. It was hypothesized that all primary relationships between constructs proposed by the model, with the possible exception of the positive emotion and behaviour components (see Figure 1), would be demonstrated and that the model would provide an adequate fit to the data.

In addition, the current study also assessed potential gender differences in the variables of interest and in the relationships between those variables as identified in the overall model. Previous findings concerning gender differences in driver anger and aggression have been very mixed (see Hennessy, Wiesenthal, Wickens, & Lustman, 2004, for a review of gender differences in general and driving-related aggression). Deffenbacher, Oetting, and Lynch (1994) found small differences in the types of negative events that anger male versus female drivers, but the overall level of anger exhibited by male and female respondents was equal and subsequent research has not replicated the gender difference in the nature of anger-provoking events (e.g., Lajunen, Parker, & Stradling, 1998). Hennessy and Wiesenthal (2001a, 2002a, 2002b) found that gender failed to predict self-reported mild driver aggression, but males were found to report greater driver violence than females. The authors suggested that the lack of gender differences in mild driver aggression may be the result of the anonymity found in the driving environment. The perception of deindividuation and anonymity associated with

operating a motor vehicle may liberate female drivers from their traditionally passive gender role, thereby facilitating the behavioural expression of anger and aggression. The gender difference associated with the more extreme case of driver violence likely reflects the highly physical and overt nature of driver violence. Physical forms of aggression and hostility are generally greater among males, whereas indirect or relational hostility is generally more common among females (Björkqvist, 1994; Björkqvist, Lagerspetz, & Kaukiainen, 1992; Lagerspetz, Björkqvist, & Peltonen, 1988). Moreover, driver violence likely requires prolonged contact with the victim, which reduces the perception of anonymity. Extending research of gender differences into the realm of driver attributions may help to determine whether or not male and female drivers are angered by different types of negative driving events, and if so may provide some explanation as to why these gender differences occur.

STUDY 1

The most common methodology used to study attributions in the driving environment is the use of fictional or hypothetical scenarios presented through either the printed word or audio playback (e.g., Arkkelin et al., 1979; Brickman et al., 1975; Feather & Deverson, 2000; Shaver, 1970a, 1970b; Shaw & Skolnick, 1971; Vallières et al., 2005; Walster, 1966). This standard methodology is often used because of its convenience and because it maximizes the degree of experimental control. In addition, it allows for the study of the maximum range of attributional, emotional, and behavioural responding that might occur in the real driving environment. When initiating a new line of research, it is important to understand the full gambit of possible responses before

narrowing focus on any particular issue. Thus, the first study was designed to examine Weiner's model (1995, 1996) across all levels of causal attribution. In order to do so, a scenario involving a driver being cut off on the highway was developed. The cut-off scenario was chosen as it is often identified as the most potentially anger-provoking driver offence (Britt & Garrity, 2006; Sarkar, Martineau, Emami, Khatib, & Wallace, 2000; Wickens et al., 2005). Two of the five causal dimensions in Weiner's model (i.e., Controllability and Intentionality) were chosen for experimental manipulation. Although the experimental manipulation of all causal dimensions might have been preferred, it would not have been feasible in the context of a single study. In addition, although Weiner (1995, 1996) makes clear distinctions among the causal dimensions and provides clear examples when the presence of one dimension can occur in the absence of another, it is often common for these attributions to be positively correlated (Anderson, 1983), perhaps because it is difficult for perceivers to differentiate these concepts. Nonetheless, it is likely that a full range of scores in one causal dimension (e.g., Controllability) will be reflected by a full range of scores in the other dimensions (e.g., Locus of Causality) as well. These causal dimensions were manipulated by altering the situational information about the cut-off behaviour made available to the participant.

In the current context, all causal dimensions were expected to be positively correlated. Even in the case of Controllability and Intentionality, where the presence and absence of these dimensions was systematically controlled and fully balanced, a positive correlation was anticipated due to the very fine distinctions that might be difficult for participants to make. More attributions of Controllability, Intentionality, Stability, and

Globality, and a more person-focused Locus of Causality were expected to be associated with stronger judgments of Responsibility. Greater perceived Responsibility was expected to predict more Anger and less Sympathy toward the driver. Anger was hypothesized to predict greater anticipated Aggressive responding, and Sympathy was expected to predict more anticipated Prosocial responding. In addition, negative correlations between Anger and Sympathy and between Aggressive and Prosocial Behaviour were anticipated.

Method

Participants

Participants were undergraduate students registered in six different psychology classes. In one of the six classes, participants received course credit in exchange for their participation. In the other five classes, participation was completely voluntary. A total of 240 participants completed the study; however, two surveys were spoiled and 22 participants who identified themselves as not having a driver's licence were deleted from the sample. The remaining sample consisted of 64 males and 152 females[1]. The mean age of participants was 22.10 years (SD = 4.07), and participants reported having possessed a driver's licence for a mean of 5.06 years (SD = 3.96) and driving a mean of 4.05 days per week (SD = 2.47).

[1] Kline (2005) recommends a sample size for path analysis of 10 participants for each free parameter included in the model, and notes that if the ratio is less than 5:1 the "statistical precision of the results may be doubtful" (p. 111). In the current study, the initial model proposed includes 28 free parameters, indicating a recommended sample size of 280. Given the final sample size in both Studies 1 and 2, it is possible that optimal power levels may not have been achieved; though the sample size never approached the 5:1 ratio identified by Kline as detrimental to the reliability of the results.

Measures and Procedures

This study adopted a two by two between-subjects design. In each of the four conditions, participants were asked to read a written driving scenario and to try to imagine themselves actually experiencing the situation described. In each condition, the main story line was the same. Participants were asked to imagine that they were travelling in the centre lane of Highway 401 (the main highway in the Greater Toronto Area). In their rear view mirror, and then their left side view mirror, they notice another vehicle slowly overtaking them in the passing lane. When the vehicle finally overtakes them in the left lane, the driver of this vehicle suddenly pulls in front of them, cutting them off and forcing them to slam on their brakes.

The situational context of this negative driving event was experimentally manipulated in order to suggest the presence or absence of Controllability and the presence or absence of Intentionality. In a fully-crossed research design, participants were randomly assigned to one of four conditions (i.e., Controllability – Intentionality [CI], Controllability – No Intentionality [CNI], No Controllability – Intentionality [NCI], No Controllability - No Intentionality [NCNI]). In the CI condition, participants were told only that the other driver signalled once just as the vehicle pulled directly in front of them. In the CNI condition, participants were told that there was a construction sign indicating that the left lane would end. Just as they both came over the crest of a hill, the left lane ended and the other driver suddenly pulled in front of them. In the NCI condition, participants were told that they both came over the crest of a hill and suddenly a pothole was visible in the left lane. The other driver suddenly pulled directly in front of

them. Finally, in the NCNI condition, participants were told that the other vehicle's rear right tire suddenly blew out and the driver pulled directly in front of them. The study's informed consent form and the full written driving scenarios are provided in Appendices A and B, respectively.

After reading and imagining themselves in the assigned driving scenario, all participants completed the same set of questions regarding causal dimensions and judgments of the scenario and anticipated emotions and behaviours in response to the scenario. The questionnaire was developed specifically for this study. The causal dimensions included in the questionnaire were Controllability (five items), Intentionality (four items), Locus of Causality (six items), Stability (four items), and Globality (three items). Controllability and Intentionality items also served as a manipulation check. The causal judgment of Responsibility was measured using four items. Anticipated emotions included Anger (five items) and Sympathy/Concern (three items), and the anticipated behaviours included more Aggressive Behavioural responses (eight items) and more Prosocial Behavioural responses (three items). Respondents were asked to rate each item on a 7-point Likert-type scale. Given the exploratory nature of the research, Aggressive Behaviour items incorporated a full range of possible aggressive driver responses including more minor expressions (e.g., yelling at the other driver) as well as more extreme aggressive episodes (e.g., getting out of the vehicle ready to engage physically with the other driver). Previous research has tended to focus on less aggressive responding (e.g., Britt & Garrity, 2006), as more extreme forms of aggression are not likely to be reported, either because of minimal frequency or social desirability. For this

reason, it was expected that the Aggressive Behaviour construct might need to be revised before the final analysis. A series of demographic questions was also included at the end of the survey. The items from the questionnaire used in the current analysis are provided in Appendix C.

Results

Exploratory Factor Analysis and Reliability Assessment

In order to explore the dimensional structure of the questionnaire, a series of exploratory factor analyses was conducted using SPSS 16. The items were divided into manipulated and unmanipulated causal dimensions, causal judgment, emotions, and behaviours, as dictated by the proposed attributional model. Unweighted least squares extraction was used, and because factors were expected to be highly correlated, a promax rotation was applied.

Before conducting the analysis, the assumptions of the statistical test were considered. Exploratory factor analysis assumes a lack of both univariate and multivariate outliers (Garson, 2009a); however, given the limited range of the item response format (i.e., scores ranging from 1 to 7), it is unlikely that either type of outlier would have been present. There were predominantly moderate to strong inter-item correlations (i.e., $r > .30$ or $r < -.30$); yet no inter-item correlation exceeded .90, which would have indicated the possible presence of multicollinearity (Tabachnick & Fidell, 2001). Finally, a review of bivariate scatterplots confirmed that the items were linearly related to each other.

Manipulated Causal Dimensions. Factor analysis using unweighted least squares extraction with promax rotation was performed on the nine items designed to represent

Controllability and Intentionality. Based on the scree plot, two factors were extracted, with communalities ranging from .628 to .837. Extracted communalities represent the extent of overlap between the item and the factors (Hetzel, 1996). Hetzel (1996) argues that both the factor structure and pattern matrices should be considered when interpreting exploratory factor analyses. The factor structure matrix contains the bivariate correlations of the items with the factors, whereas the factor pattern matrix contains regression coefficients that indicate the importance of the factor to the item with all other factors partialled out. The structure and pattern matrices for the present factor analysis are presented in Tables 1 and 2, respectively. A review of these matrices clearly indicates that the structure and pattern coefficients are very similar in this case. Focusing on the pattern matrix, all Controllability items loaded most strongly on the first factor (ranging from .757 to .897) and all Intentionality items loaded most strongly on the second factor (ranging from .684 to .955). Controllability accounted for 47% of the total variance across items and Intentionality accounted for 43% of the total observed variance. The correlation of the Controllability factor with the Intentionality factor was .50. Subsequent reliability analysis using Cronbach alpha generated values well above the recommended minimum of .70, which represents a moderate level of internal consistency considered acceptable for exploratory research (see Nunnally & Bernstein, 1994). Table 3 contains the calculated Cronbach alpha for all variables (following any changes suggested by factor analytic indicators). Means and standard deviations of all variables are also provided in Table 3.

Unmanipulated Causal Dimensions. Again, factor analysis using unweighted least squares extraction with promax rotation was performed on the thirteen items designed to measure Locus of Causality, Stability, and Globality. Based on the scree plot, only one factor was extracted. Given that two of the three Globality items were among the lowest extracted communalities and factor loadings, a subsequent factor analysis of the ten Locus of Causality and Stability items was conducted. Again, the scree plot indicated a one-factor solution. In this case, the extracted communalities ranged from .323 to .704. The factor pattern matrix (see Table 4) indicated that all items loaded strongly onto the factor (values ranging from .569 to .839), and the total variance accounted for by that factor was 54%. In addition, based on a review of the intra-item correlations of both Locus of Causality and Stability and a review of the inter-item correlations of these variables, it was fairly clear that there was no statistical difference between the theoretically proposed factors of Locus of Causality and Stability. Although it would have been statistically acceptable to retain all of the ten items within the factor, only the Locus of Causality items were retained because of the theoretical distinction between the concepts. Therefore, both Stability and Globality were deleted from further statistical consideration. A final factor analysis was conducted on the six Locus of Causality items to confirm the presence of only one factor. The extracted communalities for this analysis ranged from .290 to .832. The factor matrix is provided in Table 5, and factor loadings ranged from .539 to .912. The total variance accounted for by this factor was 59%. Subsequent analysis confirmed that the Locus of Causality measure possessed strong reliability (see Table 3).

Causal Judgment. Factor analysis using unweighted least squares extraction with promax rotation was also conducted on the four items designed to measure Responsibility in order to confirm the presence of only one factor. Based on the scree plot, only one factor was extracted. The extracted communalities ranged from .171 to .653. The factor pattern matrix is provided in Table 6, and indicates that all items loaded onto the factor with loadings ranging from .413 to .808. The total variance accounted for by the factor was 47%. The Cronbach alpha for these four items was .752.

Anticipated Emotions. The five Anger items and three Sympathy/Concern items were also factor analyzed. Based on the scree plot, two factors were extracted, with communalities ranging from .686 to .835. The factor structure and pattern matrices are provided in Tables 7 and 8. As expected, all Anger items loaded most strongly on the first factor (with pattern coefficients ranging from .815 to .883) and all Sympathy/Concern items loaded most strongly on the second factor (with pattern coefficients ranging from .797 to .919). The Anger factor accounted for 55% of the total observed item variance and the Sympathy factor accounted for 42% of the total observed item variance. The correlation of the Anger factor with the Sympathy factor was -.51. Subsequent reliability analysis using Cronbach alpha generated reliability estimates of .936 and .911 for Anger and Sympathy/Concern, respectively.

Anticipated Behaviours. The eight Aggressive Behaviour items and the three Prosocial Behaviour items were also factor analyzed. Based on the scree plot, three factors were extracted, with communalities ranging from an extremely low value of .108 to an extremely high value of .999. The factor structure and pattern matrices are provided

in Tables 9 and 10. Most of the Aggressive Behaviour items loaded onto the first factor and the Prosocial Behaviour items loaded onto the second factor, whereas the third factor consisted of the most extreme aggressive responses (i.e., reporting the other driver to the police, getting out of your vehicle to argue verbally with the other driver, and getting out of your vehicle to physically engage the other driver). These items were highly skewed such that most participants indicated minimal likelihood of engaging in these more extreme forms of aggressive responding. Therefore, these items were eliminated from the analysis, and a second factor analysis was conducted on the remaining behavioural items.

Not surprisingly, the scree plot suggested two factors. The extracted communalities ranged from an extremely low .094 to .924. The factor structure and pattern matrices based on a two-factor solution are provided in Tables 11 and 12. As expected, all remaining Aggressive Behaviour items loaded onto the first factor (with pattern coefficients ranging from .465 to .857). In terms of the Prosocial Behaviour factor, two items loaded onto the factor very strongly (i.e., .864 and .967); however, one of the items (i.e., How likely is it that you would gesture/signal to the other driver that everything is okay?) had a pattern coefficient of only .252. Although it could be argued that this item might have warranted removal from the scale, the item taps an important theoretical concept and was therefore retained in the scale. The Aggressive Behaviour factor accounted for 34% of the total variance and the Prosocial Behaviour factor accounted for 25% of the total variance. The correlation of the Aggressive Behaviour factor with the Prosocial Behaviour factor was -.21. Subsequent analyses generated

Cronbach alpha reliability estimates of .829 and .700 for Aggressive and Prosocial Behaviour, respectively.

Manipulation Check

In order to confirm the effectiveness of the experimental manipulation, 2 two-way analyses of variance (ANOVA) were conducted. The presence versus absence of control and intent served as the independent variables for both ANOVAs. The first test examined Controllability scores and the second examined Intentionality scores.

The data were first screened to confirm that all assumptions of the tests were met. Histograms indicated that the Controllability scores were approximately normally distributed at all levels of the independent variables; however, Intentionality scores for the NCI cell appeared to be slightly positively skewed. In addition, boxplots identified the presence of two Intentionality outliers in the NCI cell and one Controllability outlier in the CI cell. As the removal of the outliers had no effect on the significance tests from the ANOVAs, the outliers were retained in the dataset. When assessing homogeneity of variance, Tabachnick and Fidell (2001) recommend examining the F_{max} variance ratio, which compares the highest and lowest variance of all cells, with a ratio of up to 10 considered acceptable when cell sizes are approximately equal. The F_{max} statistic for Controllability was 2.06 with the CI outlier retained and 2.47 if the outlier was removed. The F_{max} statistic for Intentionality was 1.40 with the two NCI outliers retained and 1.79 if the outliers were removed. Furthermore, the two-way ANOVA is considered fairly robust to variance heterogeneity when sample sizes are approximately equal (Garson, 2009b; Glass & Stanley, 1970).

The ANOVA of Controllability scores revealed a significant main effect for the presence versus absence of control ($F(1,212) = 116.886, p < .001$) and a significant main effect for the presence versus absence of intent ($F(1,212) = 10.274, p < .01$). It also resulted in a significant interaction effect ($F(1,212) = 7.297, p < .01$). The ANOVA of Intentionality scores revealed a significant main effect for the presence versus absence of intent ($F(1,212) = 28.407, p < .001$) and a significant main effect for the presence versus absence of control ($F(1,212) = 33.071, p < .001$). It also resulted in a significant interaction effect ($F(1,212) = 10.145, p < .01$). The main effect of the presence or absence of control for the Controllability scores and the main effect of the presence or absence of intent for the Intentionality scores suggest that the experimental manipulation was successful. The interaction effects were not entirely unexpected, as these causal dimensions might be assumed by perceivers to co-occur, resulting in the presence of only one dimension producing attributions of the other dimension. For instance, in the absence of control, the NCI group reported higher Controllability scores than the NCNI group (see Figure 2). However, when focusing on the Intentionality scores (see Figure 3), the NCI group reported similar Intentionality scores to both intent-absent groups (i.e., NCNI and CNI). This suggests that the NCI manipulation may not have been successful in its implication of the presence of intent.

Path Analysis

Path analysis was conducted to examine the proposed model in the current dataset. First, the data were screened using SPSS 16 and AMOS 16 to ensure that all assumptions of the analysis were met. No univariate outliers were identified.

Mahalanobis distance was calculated for each observation to identify any multivariate outliers, but none were found. Mardia's measure of multivariate kurtosis was 7.656, indicating moderate levels of non-normality (Mardia, 1970). An examination of bivariate scatterplots confirmed approximate linearity. In assessing multicollinearity, an intercorrelational analysis confirmed predominantly moderate to strong inter-item correlations, but no inter-item correlation exceeded .90 (see Table 13).

Given the moderate non-normality of the data, the path analysis was conducted using the Satorra-Bentler corrected model fit statistics and robust standard errors (Satorra & Bentler, 1994, 2001) as implemented with Mplus 5.2. The path analysis used the maximum likelihood method of parameter estimation, deleting only two cases with missing data listwise. In assessing the fit of Weiner's (1995, 1996) model to the current dataset, the proposed model was estimated along with several direct paths that were expected to be mediated fully by one other variable in the model. For instance, Anger was regressed onto Controllability, Locus of Causality, and Intentionality, although full mediation through Responsibility was expected to make these paths non-significant. Using critical ratios of the parameter estimates, the non-significant paths that were not part of Weiner's original model were then deleted in a step by step fashion, proceeding from the smallest to the largest non-significant values.

In assessing the fit of the initial model, with all direct paths included, the chi-square goodness of fit statistic was significant ($x^2(8) = 28.903, p < .001$); however, this fit index is known to be overly sensitive to the size of correlations and to sample size (Kline, 2005). The model fit was adequate based on the values of the CFI (.966) and the SRMR

(.032), although the RMSEA (.110) was indicative of poor fit (see MacCallum, Browne, & Sugawara, 1996). In assessing the final model with non-significant direct paths removed (see Figure 4), the RMSEA (.097) improved slightly, indicating mediocre fit; whereas, the other fit indices were virtually identical to the initial model ($x^2(11) = 32.994$, $p < .001$,CFI = .964, SRMR = .039). The step by step deletion of non-significant paths mediated by one other variable led to the deletion of three direct paths; however, Responsibility did not fully mediate the relationships between the causal dimensions of Intentionality and Locus of Causality and Anger, nor did Responsibility fully mediate the relationship between the three causal dimensions and Sympathy. In addition, the hypothesized relationship between Responsibility and Sympathy was not significant and the correlation between the residuals of Aggressive and Prosocial Behaviour was not significant. As these non-significant findings were hypothesized relationships, they were retained in the final model.

In light of the finding that Responsibility did not mediate fully the relationship between the causal dimensions of Intentionality and Locus of Causality and the Anger emotion, partial mediation was tested using the product of *z*-score approach (see MacKinnon, Fritz, Williams, & Lockwood, 2007) as implemented in the software program Prodclin2. This method produces a 95% confidence interval for the mediated effect, which indicates mediation at a .05 level of significance if the confidence interval does not include the value zero. Results of these mediation tests revealed that Responsibility partially mediated the relationship between the causal dimensions of Intentionality and Locus of Causality and the Anger outcome. Partial mediation of the

relationship between all three causal dimensions and Sympathy was not tested, as the hypothesized relationship between Responsibility and Sympathy was not significant in the final model.

Overall, the values of the squared multiple correlations (R^2) indicated that the model accounted for 69% of the variance in Responsibility, 44% of the variance in Sympathy, 41% of the variance in Anger, 40% of the variance in Aggressive Behaviour, and 28% of the variance in Prosocial Behaviour.

Assessment of Gender Effects

In order to determine whether or not there was a difference between the mean score of male versus female participants on the primary variables of interest, a series of independent samples *t*-tests were conducted using SPSS 16. Due to unequal group sizes, variance heterogeneity was often a concern. A Welch test was used to compensate for heterogeneity of variance when needed. The assumption of normality was violated by the Intentionality and Prosocial Behaviour variables. In the case of Intentionality, a logarithmic transformation resolved non-normality. However, in the case of Prosocial Behaviour, a floor effect among male participants prevented transformations from resolving the problem, thus the *t*-test was conducted on the untransformed data. A total of eight *t*-tests were conducted simultaneously; therefore, in order to control for familywise error a Bonferroni adjustment required a significance level of $p = .006$ when interpreting the results of the *t*-tests. At this level of significance, no differences between male and female participants were found. The descriptive statistics for the assessment of gender effects are presented in Table 14.

A multiple group analysis was conducted to determine whether the final model had equivalent parameters across gender. The multiple group analysis compared a model with all free parameters ($\chi^2(22) = 42.280, p < .01$) to a model with regression weights constrained as equal across male and female participants ($\chi^2(34) = 57.400, p < .01$). A corrected chi-square difference test was used to accommodate for the Satorra-Bentler scaling correction used in the estimation of the path analysis (Satorra, 2000). The corrected chi-square difference test was not significant ($\chi^2(12) = 13.400, p > .05$), indicating that the model parameters did not differ significantly by gender.

Discussion

As this was an exploratory project using a questionnaire designed specifically for this study, an exploratory factor analysis was conducted in order to assess the dimensionality of the questionnaire relative to the proposed constructs. Although the majority of factors and their relevant factor loadings were as expected, a few changes to the scales were required. The factor analysis of unmanipulated causal dimensions identified the need to remove Stability and Globality items from the analysis. Although clear theoretical distinctions between these constructs and Locus of Causality can be made, the statistical differences between the constructs within the current scenario were minimal. As previous research using these constructs has clearly demonstrated (Bauserman, Arias, & Craighead, 1995; Britt & Garrity, 2006; Islam & Hewstone, 1993; Weiner, Russell, & Lerman, 1978), these causal dimensions and the distinctions between them are important to attribution theory. However, not all types of attributions will be important to all situations. Britt and Garrity (2006), for instance, found that different

types of causal attribution were more influential when examining certain types of driving offences. In their assessment, hostile and blame attributions differentially predicted anger and aggression depending on the specific driving event in question (i.e., tailgating, cut-off, or slow driver). Attributions of stability accounted for unique variance in all driving scenarios whereas locus and globality attributions did not account for any unique variance in any of the driving scenarios.

It may be necessary for researchers to identify and focus on those attributional constructs that they think are *most* relevant to the topic of study. In the driving environment, it might be suggested that Stability and Globality are not particularly relevant, as they both address aspects of consistency. Stability addresses temporal consistency, asking whether the abusive motorist drives offensively all the time. Globality addresses situational consistency, asking whether the abusive motorist behaves offensively in other areas of his or her life. Yet, consistency is not particularly relevant in the driving environment, which is fast-paced and highly anonymous. We are unlikely to encounter an offensive driver on or off the road following the negative event. Thus, it may be more relevant to consider the dimensions of Controllability, Intentionality, and Locus of Causality. As well, Globality was originally conceptualized within the context of learned helplessness and depression (Abramson, Metalsky, & Alloy, 1989; Abramson, Seligman, & Teasdale, 1978; Bauserman et al., 1995), and has since been applied most predominantly to problematic dyadic interactions including spousal (Bauserman et al., 1995; Fincham & Bradbury, 1992) and parent-child relationships (Heatherington, Tolejko, McDonald, & Funk, 2007; Joiner & Wagner, 1996). As such, Globality may not

be easily translated into a causal dimension that has explanatory power for the driving context. It may be that the perception of situational consistency is better conceptualized as a temperament or personality characteristic on the part of the victim driver, which may take the form of pessimism, cynicism, or attributional style.

Regardless of which causal dimensions are most relevant to the driving context, because they are all conceptually similar, it is likely that they account for common variance in driver anger and aggression. If controllability and intentionality had been included in the study by Britt and Garrity (2006), then perhaps stability would not have been such a strong predictor across all scenarios. The inclusion of intentionality might also have altered the amount of variance accounted for by hostile attributions. These considerations highlight the importance of basing empirical driving-related research on established attributional theory and giving serious thought to how each of the components in that theory might best be applied to the driving environment specifically. Future research should consider the systematic study of which causal dimensions are most relevant to driver emotion and behaviour and under which driving conditions.

As expected, the results of the exploratory factor analysis also indicated the need to eliminate the most extreme aggressive behaviour items from that scale. These items were positively skewed, indicating that very few participants reported any anticipation of engaging in these behaviours. This finding might have been the result of social desirability, but it is likely an accurate reflection of the fact that most drivers do not engage in such extreme forms of road rage. In addition, one of these more extreme items (i.e., How likely is it that you would report the driver to the police in order to get him/her

in trouble?) may not have fit with the rest of the scale because it reflected a form of punishment administered through legal channels. Previous research by Dukes et al. (2001) treated the use of the law to punish an offending driver as a unique variable separate from the victim's own retaliatory aggression. The researchers found a u-shaped relationship between these two types of retaliation, thereby providing another possible reason why the item in the current study asking participants about their intentions to report the incident, failed to fit in with the rest of the Aggressive Behaviour scale.

The manipulation check confirmed that perceived Controllability was greater in the control-present driving scenarios than in the control-absent driving scenarios, and that perceived Intentionality was greater in the intention-present versus intention-absent scenarios. On the other hand, a comparison of the Intentionality scores for the NCI group to the intent-absent groups (i.e., NCNI and CNI) revealed no differences in perceived Intentionality, suggesting that the manipulation may not have been entirely successful. It could be argued that the Intentionality score for the NCI group might be expected to be slightly less than the Intentionality score of the CI group, as the situation described in this scenario is more ambiguous. However, the fact that the Intentionality score for the NCI group did not differ from that of the NCNI group suggests a failing of the manipulation. Participants in the NCI group read about an offending driver who drove over the crest of a hill and was suddenly faced with a pothole in the road. The driver chose to avoid the pothole by cutting off the participant who was driving in the next lane over. This scenario was designed to suggest the absence of Controllability, as the appearance of the pothole over the crest of the hill was entirely unforeseeable and uncontrollable. Yet, the scenario

was also designed to suggest the presence of intent, as the driver's avoidance of the pothole by cutting off the participant was a conscious decision and he or she could have chosen to drive over the pothole instead. It seems that the participants in this study considered the offending motorist's avoidance of the pothole to be a necessary or instinctual action as opposed to a reasoned choice. They may also have considered the response of the offending driver to be one that they themselves would have made, which might have altered their attribution of Intentionality. As this study was designed primarily to examine the fit of Weiner's (1995, 1996) model to the driving context, the manipulation failure in this one cell in the ANOVA is not a catastrophic concern. Fortunately, a wide range of scores on the Intentionality scale was obtained, although it is still possible that this manipulation failure may have affected the degree to which Intentionality related to the other variables in the model.

The path analysis indicated that Weiner's (1995, 1996) model generally fit the data; however, a few revisions did have to be made. As expected, Controllability, Intentionality, and Locus of Causality were positively related to Responsibility. The strength of the relationship between Intentionality and Responsibility was not as strong as the relationship between the other two causal dimensions and Responsibility, which may have been the result of the NCI manipulation failure. As expected, Anger was positively predicted by Responsibility; however, contrary to expectation Sympathy was not. Responsibility was also expected to mediate fully the relationship between the causal dimensions and emotional responses; however, only one such path was fully mediated. Specifically, Responsibility fully mediated the relationship between Controllability and

Anger. Intentionality and Locus of Causality were positively related to Anger, and Responsibility partially mediated this relationship. All three causal dimensions were negatively related to Sympathy. These three relationships are not surprising in light of the non-significant relationship between Responsibility and Sympathy. As expected, Aggressive Behaviour was positively predicted by Anger, and Prosocial Behaviour was positively predicted by Sympathy. The emotional responses fully mediated the relationship between Responsibility and the behavioural responses. The residuals of Anger and Sympathy were negatively correlated; however contrary to expectation, the residuals of Aggressive and Prosocial Behaviour were not correlated.

Although Responsibility is a principal aspect of Weiner's (1995, 1996) approach to understanding the relationship between attributions and aggressive behaviour, other theorists have questioned its central role (Feather and Deverson, 2000). Several researchers of driver behaviour have chosen not to include or to measure this specific construct in their theories and research (e.g., Britt & Garrity, 2006; Takaku, 2006; Vallières et al., 2005), essentially treating the causal dimensions as components of, rather than antecedents of, the more encompassing inference of personal responsibility. As the driving environment is so fast-paced, it is possible that there is insufficient opportunity for drivers to engage in the additional cognitive step of making a causal judgment. As such, it may be more appropriate to treat Responsibility as an automatic implication of perceived causal dimensionality rather than as an additional cognitive process. However, the presence or absence of a separate responsibility judgment in an actual driving altercation (i.e., *in situ*) would be difficult if not impossible to demonstrate. Thus, the

only available alternative is the use of post-hoc self-report measures of perceived Responsibility that assume its importance in the actual driving environment. Using this approach, the results of the current study suggest that Responsibility as a separate cognitive process can play a meaningful role in the driving context, as the relationship between Controllability and Anger was fully mediated by Responsibility. However, the fact that Responsibility only partially mediated the relationship between the causal dimensions of Intentionality and Locus of Causality and the Anger emotion suggests that the intervening role of Responsibility may not be absolute. The lack of a significant relationship between Responsibility and Sympathy, despite significant relationships between the three causal dimensions and both Responsibility and Sympathy, leads to further questioning of the precise role or nature of causal judgment in the application of attributional theory to the driving environment.

An assessment of gender differences suggested that once familywise error was controlled, there were no gender differences in any of the mean levels of the variables of interest. Males and females did not differ in their attributions for the offending driver's behaviour. The lack of gender differences in reported anger and aggressive driver behaviour is consistent with previous research (Deffenbacher et al., 1994; Hennessy & Wiesenthal, 2001a, 2002a, 2002b). Moreover, the regression relationships in the path model were not different for male and female participants, although the small number of male participants reduced the statistical power for this analysis. Future research using written scenarios should consider examining gender differences in the attributions,

emotions, and behaviours elicited in response to a variety of offensive driver behaviours, beyond cutting off other motorists.

STUDY 2

Study 2 did not attempt to conduct an *in situ* experiment; however, it was designed to examine Weiner's (1995, 1996) model in a more real-world environment. Whereas Study 1 presented a hypothetical driving scenario, Study 2 asked participants to consider an anger-provoking event that they had actually experienced. Britt and Garrity (2006) asked participants to recall specific driving events from their past. This methodology was likely designed to increase the external validity of the research, but it is possible that participants were not actually reporting events that they had experienced but rather they may have been reporting their knowledge of stereotypical driving encounters. Anger-provoking events occur very frequently (Mesken et al., 2007; Neighbors et al., 2002; Parkinson, 2001; Underwood et al., 1999), and with our busy lives the negative affect associated with these events (DeJoy, 1990; Schaeffer, Street, Singer, & Baum, 1988; White & Rotton, 1998), and likely our memory for these events, declines fairly quickly[2]. Therefore, it is quite possible that although Britt and Garrity (2006) asked participants to list the location of the driving event that they had in mind, the participants may not have been recalling details of the actual event but rather filling in the blanks with stereotype-based information. This stereotyping may have influenced their attributions

[2] Experimentally induced rumination and individual differences in ruminative tendencies have been found to prolong negative affect resulting from provocation and to increase the likelihood and severity of aggressive retaliation against the provocateur and innocent third parties (Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005; Caprara, 1986; Collins & Bell, 1997; Miller, Pedersen, Earleywine, & Pollock, 2003).

for the offending driver's behaviour and their recollection for their degree of anger and aggressive retaliation. For this reason, Study 2 of the current research project used a driving diary methodology to further evaluate the applicability of Weiner's model to the driving environment.

The nature of the negative driving events reported was expected to be very diverse and it was unclear how this diversity would impact the usefulness of the causal dimensions in the model. Additionally, it was unclear how well the behavioural components of the model, particularly Prosocial Behaviour, would perform when examining very recently recalled driving events. Thus, translating the behavioural items from Study 1 for Study 2 posed several problems. For this reason, a revised version of Weiner's (1995, 1996) model was also tested. This alternate model substituted thoughts about engaging in a particular behaviour for the behaviours themselves. This alternate model provided another means of replicating the findings from Study 1 in the event that the concerns regarding the behavioural items were valid.

Method

Participants

In order to take part in this research study, participants were required to: (a) have held a class G2 or G Ontario driver's licence for at least one year, (b) drive at least four days per week on average, and (c) have Internet access from home. Two recruitment techniques were used for this study. Fifty participants were recruited through advertisements posted across the York University campus. These respondents were paid $10 in exchange for their participation. An additional 152 participants were recruited

through the Undergraduate Research Participant Pool and these respondents received course credit in exchange for their participation. Through these two recruiting methods, 202 participants took part in this study; however, two respondents were eliminated for careless responding and one respondent was eliminated because he had previously taken part in a similar study that might result in biased responding. The remaining sample therefore consisted of 58 males and 141 females. The mean age of participants was 23.24 years (SD = 7.17), and participants reported having possessed a driver's licence for a mean of 6.04 years (SD = 5.74).

Measures and Procedures

Participants were asked to complete a total of four on-line driving diaries, once every two days. On the morning of the day that their diary entry should be submitted, participants received an email containing a link for the on-line diary. In order to facilitate the administration of the study, there was a different link for each diary entry (i.e., first diary entry, second diary entry, etc.). These diaries asked participants to describe a negative driving event involving another motorist that they had experienced in the previous two days. They were asked to describe the nature of the event, where it took place, how the encounter made them feel, and what they did after or in response to the event. In addition, participants were asked to rate on a 7-point Likert-type scale the negativity and severity of the event and the extent to which they felt anger toward the other driver. Participants were also instructed that if they had not driven in the past 48 hours or if they did not drive a far enough distance to experience even a minor annoyance on the roadway, then they should still submit their diary but that they should respond with

'not applicable' to all open-ended questions and with '1' to all scales. If participants did not submit a diary entry, they received an email each morning thereafter reminding them to do so. The study's informed consent form and the diary entry questions are provided in Appendices D and E, respectively.

Once all four diaries had been submitted, respondents were sent another link for the final on-line survey. The final survey was focused on the most upsetting and negative driving event reported in the four diaries, and this critical incident was identified in the email sent to participants with the final survey link. In order to select which of the four entries was the critical incident, the three Likert-type scales from the diary entries were used. The diary entry with the highest rating of anger towards the other driver was selected for the final survey. If multiple entries had the same score on this scale, the rating of negativity of the event broke the tie. If multiple entries had identical scores for both anger and negativity, perceived severity of the event was used to break the tie. In a few select cases, the diary entry identified by the selection criteria was inappropriate for the final survey. For example, in some cases participants failed to report an event that involved another motorist. In other cases, participants reported an altercation with an atypical vehicle such as a bus or tractor trailer or they reported an altercation involving multiple vehicles, either of which would have made many of the questions in the final survey confusing or inapplicable. Therefore, in these cases, the next most upsetting event was identified as the focus for the final survey.

At the beginning of the final survey, participants were asked to recall the driving event identified in the experimenter's email as the most negative and upsetting event of

the four diary entries. Participants were instructed to write a short paragraph describing this event (i.e., what happened, how did you feel, what did you do). Participants were also directed that if the selected event was not their most negative and upsetting, then they could write a short paragraph describing what in fact was their most negative and upsetting driving altercation. This exercise was designed to encourage participants to recall the specific incident in question rather than to rely upon stereotypical features of that type of event. Participants were then asked to complete a questionnaire that was almost identical to the one presented to participants in Study 1. The items in this questionnaire were revised so that they were not specific to being cut off by another motorist but rather were applicable to any number of offensive driving behaviours. In addition, the behavioural items were altered so that they asked about actual behaviours committed rather than behavioural responses that drivers anticipated committing. Revisions to the three Prosocial Behaviour items were not straightforward. Two of the items involved highly unlikely hypothetical events that would probably not have occurred during the critical incident (i.e., offering personal assistance to the driver if it were needed down the road, calling police or a tow truck to assist the driver if it were needed). The elimination of these items would have left only one item to measure Prosocial Behaviour (i.e., gesturing to the other driver that everything is okay). In addition, not knowing in advance what types of events would be reported and what opportunities for aggression would emerge, it was difficult to determine how appropriate the Aggressive Behaviour items would be in the current study.

In response to these limitations, two new sets of constructs were added to the questionnaire: Aggressive Thoughts (five items) and Prosocial Thoughts (three items). These constructs included the same types of behaviours as did Study 1; however, the items were framed in terms of what participants *considered* doing in response to the offending driver. Thus, Aggressive and Prosocial Thought items generally used the phrasing "To what extent did you THINK ABOUT...?", whereas the Aggressive and Prosocial Behaviour items used the phrasing "To what extent DID you...?".[3] The survey ended with a series of demographic questions and a full on-line debriefing. The items from the questionnaire used in the current analysis are provided in Appendix F.

Results

Diary Entries

Although participants were asked to submit diary entries every 48 hours and therefore to have completed all four diary entries within six days (from the completion of the first diary to the final diary), not every participant did so. The mean number of days taken to complete all four diary entries was 6.50 (SD = 1.41); however, the participant who took the longest took 16.78 days. For the first diary entry, 9 participants indicated that they had not encountered a negative driving event involving another motorist. For the second, third, and fourth diary entries, 13, 42, and 35 participants respectively reported not experiencing a negative driving event. Thus, a majority of drivers encountered at least one negative event involving another motorist within a 48-hour period. Across all four

[3] Two of the three Prosocial Thought items retained the same format as the Prosocial Behaviour items used in Study 1, as these items involved hypothetical events that would not likely be spontaneously considered by participants in the actual driving environment.

diary entries, an average of 88% of participants reported at least a minor anger-provoking event within that time frame.

Post Diary Survey

Participants received the link for the final survey within 24 hours of having submitted their final diary entry. However, not all participants completed the post-diary survey right away. The mean amount of time between submission of the final diary entry and initiation of the final survey was 1.93 days (SD = 1.62). The longest amount of time taken by a participant to initiate the final survey was 12.02 days. In only two cases did a participant describe a critical incident that was not included in one of the four diary entries. In one of these instances, the participant noted that the critical event took place on the morning that the participant received the link for the final survey. In some cases where participants were instructed to write about their second most upsetting or negative event because the most upsetting would not be applicable to the final survey, participants still chose to focus on the more upsetting though less appropriate driving encounter. Specifically, five participants ignored instructions and focused on driving altercations involving multiple vehicles and two participants focused on driving altercations involving atypical vehicles. Although these participants may not be representative of the population, they were retained in the analysis as there were so few of them. The mean level of anger felt toward the other driver in the critical incident was 5.45 (SD = 1.49). For approximately 76% of the sample, their reported anger toward the other driver was ranked 5 or higher on the 7-point scale. The mean perceived negativity of the critical incident was 5.27 (SD = 1.43) and the mean perceived severity was 4.37 (SD = 1.78).

The content of the critical incidents was reviewed to identify the nature of the most upsetting and negative events reported. Wickens et al. (2005) developed a reliable coding scheme for the classification of offensive driver behaviour; however, the coding scheme was developed for complaints of offensive behaviour occurring exclusively on highways. As a result, the current study adapted the coding scheme developed by Wickens et al. to reflect complaints of offensive behaviour on highways as well as major arterial and minor roadways. As the classification of the critical incidents in the current study was conducted for descriptive purposes only, the reliability of the revised coding scheme was not empirically tested. Although several categories were added which could potentially weaken the reliability of the coding scheme, the changes were not complex or excessive. In addition, the complaints of driver behaviour reported in the diary entries were not ambiguous. Therefore, the overall reliability of the coding scheme used here should be fairly consistent with that reported by Wickens et al. Nonetheless, future research utilizing the revised coding scheme to examine the content of the diary entries (including the critical incidents) for more in-depth research purposes will first need to establish the reliability of the revised coding scheme through inter-rater assessments.

In some cases, the offending driver committed multiple offensive behaviours. It was found that 39.2% of the critical incidents involved the participant being cut off or nearly sideswiped by the offending motorist. In 13.6% of incidents, the offending motorist ran a red traffic light or stop sign, resulting in a near-collision in many cases. In 12.6% of critical diary entries, the offending driver was tailgating (11.1%) or highbeaming (1.5%) another motorist. A slow driver was the focus of 12.1% of critical

diary entries, and a driver who was blocking the participant from merging or changing lanes was the focus of 9% of critical diary entries. Two percent of reported critical incidents involved a motorist budding into a queue of vehicles or inappropriately passing a queue of vehicles (e.g., shoulder running, using the merging lane to pass, moving into oncoming traffic lanes to pass). Eight percent of reported critical incidents involved other types of improper lane usage (e.g., shoulder running to pass a single vehicle, moving into oncoming traffic to pass a single vehicle, blocking the roadway when trying to move across lanes or to make a u-turn, going the wrong way on a one-way street, proceeding straight from the left-turn lane, etc.). In 4% of incidents, drivers were complaining that other motorists were honking without justification. In 3% of cases, the participant complained that another driver had made a sudden stop or turn, and in 1.5% of cases, the other driver had taken a turn too quickly or recklessly. Three percent of participants reported a driver who did not signal a lane change or turn as their primary concern; however, many of the participants who identified being cut off or sideswiped as their primary concern also noted off-hand that the offending motorist had not signalled their intention to change lanes or turn. Thus, a total of 12.6% of critical diary entries specifically noted a lack of turn signal use. Only 3.5% of incidents did not correspond to one of the situations listed above and were therefore labelled as miscellaneous. Figure 5 presents a bar graph to summarize the content of the critical diary entries.

Exploratory Factor Analysis of Aggressive and Prosocial Thoughts

Given that the Aggressive Thoughts and Prosocial Thoughts scales were new, an exploratory factor analysis was conducted to examine their dimensionality. As with Study

1, the data were fully screened before continuing with the analysis. Given the limited range of the data (i.e., scores ranging from 1 to 7), it is unlikely that outliers would impact the analysis. An intercorrelational analysis confirmed predominantly moderate to strong inter-item correlations (i.e., $r > .30$ or $r < -.30$). One inter-item correlation equalled .89, suggesting that multicollinearity may be a problem. Linear relationships among items were confirmed by reviewing bivariate scatterplots.

Predicted factors were expected to be correlated; therefore oblique rotation was used in the analysis. Specifically, unweighted least squares extraction with promax rotation was performed on the eight items designed to measure Aggressive and Prosocial Thoughts. Based on the scree plot, two factors were extracted, with communalities ranging from a very low .060 to .948. The structure and pattern matrices for the two-factor solution are provided in Tables 15 and 16. In this case, the structure and pattern coefficients are very similar. As expected, all Aggressive Thought items loaded most strongly on the first factor (ranging from .287 to .856). In terms of the Prosocial Thought items, two items loaded very strongly onto the second factor, whereas the third loaded onto both factors weakly and about equally. Normally, this finding would have been grounds for elimination of the item from the scale; however, given that the content of this item was the basis for the only Prosocial Behaviour item remaining in this study (i.e., gesturing to the other driver that everything is okay) and given that there were only two other items in the Prosocial Thoughts construct, this one item was particularly important to the scale. Without it, Prosocial Thoughts would have consisted exclusively of helping behaviour. In addition, by retaining the item, a more thorough replication of the original

questionnaire and model could be conducted in the second study. The total variance accounted for by the Aggressive Thoughts factor was 26% and the Prosocial Thoughts factor accounted for 23% of the observed variance. The correlation of the Aggressive Thoughts factor with the Prosocial Thoughts factor was -.18.

Reliability Analysis

Table 17 contains a reliability analysis of all variables included in Study 2. Compared to the Cronbach alphas reported in Study 1, the scales in Study 2 were generally less reliable; however, this result is to be expected when moving from a controlled laboratory study to a real-world application. Interestingly, Intentionality and Anger had similar Cronbach alphas in both studies, and the Sympathy scale was more reliable in Study 2. The largest decrease in reliability from Study 1 to Study 2 was for the Locus of Causality scale, which decreased from .887 to .581. Table 17 also presents the means and standard deviations of all variables.

Path Analysis

Before conducting the path analysis for both Weiner's (1995, 1996) model (henceforth referred to as the Behaviours Model) and the revised model (henceforth referred to as the Thoughts Model), the data were screened to determine if the assumptions of the analysis were met. An examination of bivariate scatterplots confirmed that the relationships among variables were approximately linear. However, given the nature of the methodology, it is not surprising that the observed variables were not normally distributed. Participants were asked to consider their most anger-provoking event from the diary period, suggesting that the variables should be highly skewed. This

was, in fact, the case. More importantly, Mardia's measure of multivariate kurtosis for the Thoughts Model was 3.307 and for the Behaviours Model was 5.261, indicating moderate non-normality (Mardia, 1970). Many univariate outliers were identified. In order to identify multivariate outliers, Mahalanobis distance was calculated twice, once for the set of variables to be included in the Thoughts Model and once for the set of variables to be included in the Behaviours Model. Four multivariate outliers were identified, three of which were common to both models. These four cases were deleted from the dataset; however, the deletion of these four cases led to an additional case being qualified as a multivariate outlier in the Behaviours Model. Thus, this additional case was also deleted from the dataset, leaving a total of 194 participants for further analysis. In assessing multicollinearity, an intercorrelational analysis confirmed predominantly moderate inter-item correlations and no inter-item correlation exceeded .90 (see Table 18).

Given the moderate non-normality of the data, the path analysis for Study 2 was also conducted using the Satorra-Bentler corrected model fit statistics and robust standard errors (Satorra & Bentler, 1994, 2001) as implemented with Mplus 5.2. As was done in Study 1, the proposed models were estimated along with several direct paths that were expected to be mediated by one other variable in the model. Non-significant paths that were not part of Weiner's (1995, 1996) original model were then deleted in a step by step fashion.

In the initial Thoughts Model, with all direct paths included, the chi-square goodness of fit statistic ($x^2(8) = 10.036, p > .05$) indicated that the model provided a good

fit to the data. Other fit indices corroborated this finding (CFI = .994, RMSEA = .036, SRMR = .028). In the final Thoughts Model, with non-significant direct paths removed, most of the fit indices improved slightly ($x^2(14) = 13.893, p > .05$, *CFI* = 1.00, RMSEA = .000, SRMR = .037). The step by step removal of non-significant paths led to the deletion of six direct paths from the model; however, Responsibility did not fully mediate the relationships between the causal dimensions of Controllability and Intentionality and the Sympathy outcome. In addition, the hypothesized correlation of the residuals of Aggressive and Prosocial Behaviour was not significant; however, as this relationship was part of the originally hypothesized model, it was retained in the final model presented in Figure 6. In light of the fact that Responsibility did not mediate fully the relationship between the causal dimensions of Controllability and Intentionality and the Sympathy outcome, partial mediation was tested using the product of *z*-score approach as implemented in Prodclin2 (MacKinnon et al., 2007). Results indicated that Responsibility did, in fact, partially mediate these relationships ($p < .05$). Overall, the squared multiple correlations indicated that the model accounted for 39% of the variance in Responsibility, 27% of the variance in Anger, 27% of the variance in Sympathy, 36% of the variance in Aggressive Thoughts, and 8% of the variance in Prosocial Thoughts.

In the initial Behaviours Model, with all direct paths included, the chi-square goodness of fit statistic was significant ($x^2(8) = 29.027, p < .001$), and most of the other fit indices suggested a poor fit of the model (CFI = .928, RMSEA = .116, SRMR = .051). With the non-significant direct paths removed, the fit indices improved slightly ($x^2(14) = 34.769, p < .01$, CFI = .929, RMSEA = .087, SRMR = .064). In total, six direct paths

were deleted from the model. As with the Thoughts Model, Responsibility did not mediate fully the relationships between the causal dimensions of Controllability and Intentionality and the Sympathy outcome; however, subsequent tests for partial mediation using the product of *z*-score approach were significant ($p < .05$). The hypothesized correlation between the residuals of Aggressive and Prosocial Behaviour was significant but positive. Finally, the path from Sympathy to Prosocial Behaviour was not significant; however, because it was hypothesized as part of the original model, this path was retained in the final model (see Figure 7). The squared multiple correlations indicated that the model accounted for 9% of the variance in Aggressive Behaviour, and less than 1% of the variance in Prosocial Behaviour.

Assessment of Gender Effects

In order to compare the mean scores of male versus female participants on the primary variables of interest, a series of independent samples *t*-tests were conducted using SPSS 16. As in Study 1, variance heterogeneity was often a concern due to unequal group sizes. A Welch test was used to compensate for variance heterogeneity when needed. Many of the variables were not normally distributed. The non-normality of Anger was resolved using a reflected logarithmic transformation and the non-normality of Aggressive Behaviour was resolved using a logarithmic transformation. Controllability, Intentionality, and Responsibility suffered from a ceiling effect, whereas Sympathy and Prosocial Behaviour suffered from a floor effect. As a result, transformations could not resolve the non-normality of these variables and the t-tests were conducted on the untransformed data. A total of ten *t*-tests were conducted

simultaneously; therefore, a Bonferroni adjustment was used to control for familywise error. The adjustment required a significance level of $p = .005$ when interpreting the results of the *t*-tests. At this level of significance, no differences were found between male and female participants. The descriptive statistics for the assessment of gender effects are presented in Table 19.

Next, a multiple group analysis was conducted to determine whether the final Thoughts Model was equivalent for male versus female participants. As in Study 1, the multiple group analysis compared a model with free parameters ($\chi^2(28) = 34.538, p > .05$) to a model with regression weights constrained to be equal across gender ($\chi^2(37) = 49.633, p > .05$). A corrected chi-square difference test was used to accommodate for the Satorra-Bentler scaling correction used in the estimation of the path analysis (Satorra, 2000). This corrected chi-square difference test was not significant ($\chi^2(9) = 15.169, p = .09$), indicating that the regression coefficients did not significantly vary by gender.

The same multiple group analysis was conducted for the Behaviours Model. As before, the corrected chi-square difference test was used to compare a model with parameters freed across gender ($\chi^2(28) = 51.755, p < .01$) to a model with regression parameters constrained to be equal across gender ($\chi^2(37) = 69.799, p = .001$). The corrected chi-square difference test revealed a statistically significant difference in the fit of the model for male versus female participants ($\chi^2(9) = 17.928, p < .05$).

As there were only two regression weights that were not shared by the Thoughts Model and the Behaviours Model (i.e., the paths between emotion and thought/behaviour), these two path coefficients in the Behaviours Model were

systematically freed to determine which of the two was significantly different for male versus female participants. When the regression weight for the path between Anger and Aggressive Behaviour was freed ($\chi^2(36) = 69.242, p < .001$), the corrected chi-square difference test found no difference between this model and the fully constrained model ($\chi^2(1) = 0.308, p > .05$). When the regression weight for the path between Sympathy and Prosocial Behaviour was freed ($\chi^2(36) = 65.096, p < .01$), the corrected chi-square difference test revealed a statistically significant difference between this model and the fully constrained model ($\chi^2(1) = 5.082, p < .05$). The standardized regression weight between Sympathy and Prosocial Behaviour was positive for males ($\beta = .19, p > .05$) and negative for females ($\beta = -.10, p > .05$).

Discussion

Overall, the results strongly support a successful replication of the laboratory-based findings of Study 1 in the more real-world research of Study 2. A review of the diary entries reveals that a majority of drivers encounter at least one negative event involving another motorist within a 48-hour period. In fact, over the course of the study, approximately three quarters of the sample experienced a negative driving event that caused them to rate their anger toward the other motorist as 5 or higher on a 7-point scale. These findings are consistent with previous reports that estimate anger to be a highly common and frequently occurring emotion on the roadways (Mesken et al., 2007; Neighbors et al., 2002; Parkinson, 2001; Underwood et al., 1999). The content of participants' most negative and upsetting driving events from the previous week were quite varied and included behaviours such as cutting off and sideswiping other motorists,

tailgating, excessively slow driving, running red traffic lights or stop signs, and blocking merges or lane changes, to name a few. By far, the most frequently reported negative driving event was being cut off or nearly sideswiped by another vehicle, which is consistent with previous research (Britt & Garrity, 2006; Sarkar et al., 2000; Wickens et al., 2005). The next most frequently reported behaviours included drivers who ran red traffic lights or stop signs, motorists who tailgated, and drivers travelling at an excessively slow rate of speed.

Due to the difficulty of translating the questionnaire from Study 1 to a questionnaire that could be used in a real-world scenario, an alternate model was developed for Study 2. This new model (i.e., the Thoughts Model) removed behavioural responses from Weiner's (1995, 1996) theory and replaced them with behavioural thoughts (i.e., behavioural responses that the driver considered making during the driving event). These behavioural thoughts were designed to reflect closely the behavioural items that were tested in Study 1, which asked participants what behaviours they anticipated acting out if they were to find themselves in the hypothetical driving scenario. Previous research has found that drivers' angry thoughts about retaliating verbally or physically against an offending driver are strongly correlated with driving-related aggression (Deffenbacher, Petrilli, Lynch, Oetting, & Swaim, 2003; Deffenbacher, White, & Lynch, 2004).

The Thoughts Model fit the data well. As predicted, the three causal dimensions were all positively correlated, although the strength of these correlations was weaker than in Study 1. Given the varied nature of the negative events, this finding is not surprising.

As predicted, all three causal dimensions were significantly related to Responsibility. Interestingly, the strength of the relationship between Intentionality and Responsibility in Study 2 ($\beta = .19$) was very similar to what it was in Study 1 ($\beta = .14$), suggesting that the NCI manipulation failure may not have affected the strength of the relationship in Study 1. It may be the case that Intentionality is not as important a causal dimension in the driving context as other causal dimensions. Perhaps motorists assume that most roadway behaviours are intentional, and therefore drivers do not rely on intentionality when making their judgments of responsibility. Research outside the driving context provides support for an 'intentionality bias' whereby we perceive actions as intentional until proof to the contrary is made evident (Rosset, 2008). It is also possible that for some participants, a lack of intention was perceived as negligence on the part of the offending driver, and that this lack of intention was associated with a judgment of the offending driver as responsible for the negative driving event.

As predicted, Responsibility was positively associated with Anger and negatively associated with Sympathy. Interestingly, this path from Responsibility to Sympathy was not significant in Study 1. This null result could be due to sampling error, but it might also suggest a situation-specific component of the model that does not work. Perhaps when cut off in traffic, a judgment of responsibility is only associated with anger and not a lack of sympathy or concern. As predicted, Responsibility fully mediated the relationship between all three causal dimensions and Anger. Responsibility also fully mediated the relationship between Locus of Causality and Sympathy; however, the relationships between the two remaining causal dimensions (i.e., Controllability and

Intentionality) and Sympathy were only partially mediated. As expected, Aggressive Thoughts was positively predicted by Anger, and Prosocial Thoughts was positively predicted by Sympathy. Also as expected, the residuals of Anger and Sympathy were negatively correlated. However contrary to hypotheses, but similar to the results of Study 1, there was no correlation between the residuals of Aggressive and Prosocial Thoughts. The amount of variance in each of the endogeneous variables accounted for by the model was less in Study 2 than in Study 1, which is not surprising given the more varied nature of driving events addressed and the lack of experimental control characterizing Study 2. The greatest declines in variance accounted for in Study 1 versus Study 2 were Responsibility ($\Delta R^2 = .294$) and Prosocial Thoughts ($\Delta R^2 = .205$ relative to Prosocial Behaviour).

The parameter estimates for the first half of the Behaviours Model were identical to those of the Thoughts Model. It was in the latter half of the model that differences could be seen. The Aggressive Behaviour construct did seem to fit well within the Behaviours Model; however, the same could not be said for the Prosocial Behaviour construct. Specifically, the relationship between Sympathy and Prosocial Behaviour was not significant, and the correlation between Aggressive and Prosocial Behaviour was significant but in a positive direction. This finding suggests that the measure of Prosocial Behaviour may have been inadequate.

The items used to measure Prosocial Behaviour in Study 1 were very limited, and because they relied entirely on hypothetical events (e.g., offering personal assistance to the driver if it were needed down the road), it was impossible to revise them for Study 2.

As participants in Study 2 were reporting negative events, it was very unlikely that prosocial behaviour would have been part of their exchange with the other motorist. Therefore, only one item (i.e., gesturing to the other driver that everything is okay) could be retained as a measure of Prosocial Behaviour in Study 2. If the Sympathy and Prosocial Behaviour components of the model were to be examined in a future study of this type, additional items should be developed. As it would likely prove to be very challenging to identify prosocial behaviours that are actually committed in the midst of a negative driving encounter, future researchers may consider focusing exclusively on the anger and aggression portions of the model when studying real-world driving altercations.

Another interesting difference between the Thoughts and Behaviours Models is the strength of the relationship between Anger and Aggressive Thoughts versus Behaviours. In the case of Thoughts, the standardized regression coefficient was .60 and in the case of Behaviours, it was .30. In addition, the amount of variance accounted for by the model was greater for Aggressive Thoughts (R^2 = .364) than for Aggressive Behaviours (R^2 = .089). Clearly, the Thoughts Model more closely replicated the conditions of Study 1, in which the standardized regression coefficient between Anger and Aggressive Behaviour was .63 and the model accounted for 40% of the variance in Aggressive Behaviour. It is possible that the decline in the regression coefficient from the Thoughts to the Behaviours model in Study 2 reflects the fact that drivers do not enact all of the behaviours they consider. The mean scores for Aggressive Thoughts (4.46) and Aggressive Behaviours (2.64) support this interpretation. Fortunately, given the

frequency of driver anger on the roadways, drivers usually inhibit their aggressive tendencies.

In examining the effect of gender, no gender differences were found in any of the mean scores of the variables of interest once familywise error was controlled. If a greater number of male participants could have been recruited, it may have been possible to assess gender differences in the types of negative driving events reported in this type of diary study. This could be a goal for future research. As with Study 1, the lack of gender differences in reported Anger and Aggressive Behaviour is consistent with previous research (Deffenbacher et al., 1994; Hennessy & Wiesenthal, 2001a, 2002a, 2002b). The equivalence of the model in male versus female participants was tested using a multiple group analysis. The Thoughts Model did not demonstrate gender differences, although the small number of male participants reduced the statistical power for this analysis. In the case of the Behaviours Model, there were significant gender differences in the regression coefficients. Given that the Thoughts Model and the Behaviours Model were identical except for the final two paths between emotion and thought/behaviour, these paths were examined to determine which significantly differed across gender. The relationship between Sympathy and Prosocial Behaviour was positive for males but negative for females; however, as has been previously mentioned, the Prosocial Behaviour variable may have been inadequate.

Although this driving diary study presented a clear benefit of improved memory for actually experienced driving altercations, it is possible that the nature of the study altered these events in some way. Given that participants were asked to keep track of the

negative events they experienced, they may have been primed to experience them differently. Perhaps participants assigned more importance to events that they would otherwise have completely ignored. Perhaps they responded in a less aggressive fashion, as they were primed to consider issues of driver safety. Perhaps they responded more aggressively, as they were asked in each diary entry about their level of anger and about ways in which they could have aggressed. Whenever research attempts to study a real-world phenomenon using anything more than unobtrusive measurement, it is possible that measurement itself alters the phenomenon. For this reason, future studies should consider the inclusion of other research methodologies.

Finally, one of the most impressive features of Weiner's (1995, 1996) model is that it applies to many different situations in many different contexts. For instance, in its application to transgressions in the workplace, it is not limited to just one type of transgression (Struthers et al., 2001, 2005). The model applies to multiple types of interpersonal gaffes or forms of wrongdoing. In terms of driving behaviour, it is likely that responsibility judgments of different types of negative encounters (e.g., tailgating, cut-off, slow driver) rely on different causal dimensions and attributions; however, the model should hold overall. In the current study, the specific types of events that were identified as critical events and were therefore the basis of all survey responses may have influenced the relative strength of the relationships between the causal dimensions and Responsibility. As suggested by the findings of Britt and Garrity (2006), the model may fit differently for those events that involved being tailgated, for example, than it does for those events that involved being cut off. The current dataset does not contain a sufficient

number of reports of each type of negative driving behaviour to allow an assessment of the fit of the model for each behaviour type. Future research could include the continuation of this type of diary study to allow for the accumulation of reports needed to determine which causal attributions are most relevant to each type of driving altercation.

GENERAL DISCUSSION:

FUTURE RESEARCH AND REAL-WORLD APPLICATIONS

Taken together, the two studies outlined in this report suggest that Weiner's (1995, 1996) attributional model of social conduct is a good fit to the driving environment. The causal dimensions provide a good means of classifying various types of offensive driver behaviour, and the model as a whole provides a reliable means of predicting driver anger and aggression. With the exception of the Behaviours Model in Study 2, these studies also suggest that the model may provide a means of accounting for sympathy and prosocial behaviour in the driving environment, although these constructs will need further research attention before they can be fully understood. Differences between the Thoughts and Behaviours Models in Study 2 were also very informative. The stronger relationship between Anger and Aggressive Thoughts versus Behaviours and the greater amount of variance within Aggressive Thoughts versus Behaviours that was accounted for by the model demonstrate that individuals do not enact all of the behavioural responses that they consider. The diary reports collected in Study 2 clearly demonstrate that episodes of driver anger on roadways are extremely common. Approximately three quarters of the sample reported a negative driving event with an anger-rating of 5 or higher on a 7-point scale. In approximately 39% of these cases, the

driver complained about being cut off or nearly sideswiped, which is consistent with previous research (Britt & Garrity, 2006; Sarkar et al., 2000; Wickens et al., 2005). Although gender differences were not the focus of the current research, they were assessed in both studies; however no effect of gender was found. This absence of gender effect may have been due to significant differences in the number of male versus female participants within both studies. Future research considering gender differences as they relate to attributional processes, anger, and aggressive behaviour in the driving environment should ensure more equal representation of each gender within the sample.

The design and methodology of the current research has several strengths. First, it considered a more complete version of Weiner's attributional model including multiple causal dimensions and causal judgment, as well as positive emotions and behaviours. Second, the research utilized two distinct methodologies to examine the same research question. The written scenario methodology was laboratory-based and maximized experimental control, whereas the driving diary methodology allowed for the inclusion of real-world experiences, thereby taking an important first step towards the more advanced research goal of ecological validity. Finally, the driving diary methodology also allowed Weiner's model to be assessed across a diversity of negative driving encounters, demonstrating that his model holds in the face of significant situational variability.

Despite these significant strengths, future research will first need to address the limitations of the current study by refining theoretical constructs, expanding the range of methodological techniques, and including more diverse samples in testing the application of this model. The secondary goal of future research will be the consideration of other

factors and variables that might impact the cognitive-emotional-behavioural sequence identified in Weiner's (1995, 1996) model. As is clear from the squared multiple correlations, there is still a significant amount of variance in driver anger and aggression for which researchers must account. Extensions of Weiner's model or more expansive theoretical models may need to be considered in order to integrate many of the relevant factors. Some of these variables include fixed traits as perceived by victim drivers, cognitive load, and individual difference variables. The final step of any research program is the application of the findings to the real world. The study of attributions in the driving environment has already yielded valuable findings that may help to improve driver safety. The general discussion that follows addresses all of these issues.

Future Research to Address the Limitations of the Current Study

Refining the Theoretical Constructs

The most pressing future research projects will involve refining and validating Weiner's (1995, 1996) model in the driving context. Part of this process involves honing the measures so that they take into account both theoretical reasoning and principles of practical application. Like many theories that have stood the test of time, Weiner's attributional model of social conduct has evolved since its conception, and has undergone several minor revisions in its distinction between constructs. For instance, in one of his books outlining the theory, Weiner (1995) addressed a distinction between causal controllability and responsibility that he had not identified in previous theoretical discussion. These finer distinctions are likely more appropriate and necessary for some situations than they are for others. Nonetheless, once the value of the general construct

has been established in a given context, these distinctions between constructs should be thoroughly assessed in subsequent applications of the model.

In the current study, the construct of Responsibility did not reflect some of the finer distinctions that Weiner (1995) and other attribution theorists have made. Several theorists have distinguished between the concepts of responsibility and blame (Fincham & Shultz, 1981; Shaver, 1985; Shultz & Darley, 1991; Shultz, Schleifer, & Altman, 1981; Shultz & Wright, 1985). Some might argue that these concepts are used interchangeably in everyday language and that to distinguish them is to be splitting hairs. However, attribution theorists argue that responsibility is affectively neutral, whereas blame assumes an element of emotion (Weiner, 1995). Moreover, in situations where an outcome is trivial in terms of its consequences, an actor may be perceived as responsible for the outcome but face minimal blame (Weiner, 1995). As the current study was one of the first applications of Weiner's (1995, 1996) model to the driving context, the focus was to ensure that the general concept of responsibility within the model could be applied to this new environment. However, more systematic study is needed to determine if the theoretical distinction between the constructs of blame and responsibility is practically and statistically necessary in this new application. Moreover, additional research may still demonstrate that the construct of responsibility is not necessary for the study of driver aggression, as the fast-paced environment fails to provide sufficient opportunity to cognitively process a judgment of responsibility. As previously mentioned, research in the field has already demonstrated that models excluding this construct can account for

significant variance in driver anger and aggression (Britt & Garrity, 2006; Takaku, 2006; Vallières et al., 2005).

Expanding the Methodological Repertoire

Expanding the types of research methodology used to study attributions in the driving environment is also essential to the advancement of this area of research. The use of hypothetical scenario studies has been the standard in the field thus far, with a few diary studies conducted in order to increase external validity and to reduce reliance on stereotypical details that drivers might have committed to memory. With recent developments in simulator technology, there is great potential to study the attribution process *in vivo*, which would further increase external validity of the research and would eliminate the concern of lapses in memory that might affect diary studies. Simulator research would also allow for the examination of behavioural measures of driver anger and aggression. This would be very beneficial as the use of rating scales can be highly reactive, making it difficult to determine if responses are spontaneous or merely prompted by the questions asked (DeJoy, 1990). The importance of studying driver anger and aggression using multiple techniques is particularly important in light of recent findings that the empirically demonstrated relationship between driver anger and aggression is subject to method variance (Nesbit et al., 2007). In addition to behavioural measures of anger, it might also be beneficial to utilize physiological measures of emotion in attributional driving research. Physiological measures have been used in previous studies of driver anger (Malta et al., 2001; Parsons, Tassinary, Ulrich, Hebl, & Grossman-Alexander, 1998; Stokols, Novaco, Stokols, & Campbell, 1978; White &

Rotton, 1998) and may provide an additional means of understanding how negative attributions for driver behaviour can impact us. It might also be possible to utilize implicit measures of attributional tendencies or attitudes in order to overcome the limitations of self-report data. The Implicit Association Test (IAT) has just begun to be used in driving-related research (e.g., Hatfield, Fernandes, Faunce, & Job, 2008) and may be able to inform the study of attributional processing in the driving context.

Applying the Model to Experienced Drivers

It will also be important to ensure that Weiner's (1995, 1996) model applies to all driver behaviour and not just to the behaviour of young drivers who made up the majority of the sample in this research. Novice motorists have been found to be overconfident with respect to their actual driving skills (Mynttinen et al., 2009). Young drivers believe that they engage in less risky driving than their peers (Harré et al., 2004) and that they are less likely than their peers to be involved in a motor vehicle collision (DeJoy, 1989, 1992; Finn & Bragg, 1986; Glendon, Dorn, Davies, Matthews, & Taylor, 1996; Matthews & Moran, 1986). Although optimism biases are prevalent among all age groups, some studies have suggested that this bias is particularly pronounced among young people in the driving context (Harré et al., 2004; Matthews & Moran, 1986). Unfortunately, overly positive misperceptions about one's own driving skills and abilities may serve to reduce one's tolerance for the erroneous or negative behaviour of other road users.

Without future research focusing on more experienced drivers, it will be impossible to determine if Weiner's (1995, 1996) model applies to all drivers in the same way. It may be the case that more experienced drivers are more likely to consider

situational causes when faced with negative driver behaviour, and thus to make less internal and dispositional attributions on the roadways. Risky and aggressive driving is far more prevalent among young motorists (Krahé & Fenske, 2002; Lajunen & Parker, 2001; Shinar, Schechtman, & Compton, 2001; Smart, Mann, & Stoduto, 2003; Yagil, 1998). It may be the case that the relationship between attributions and driver anger and aggression applies only to hot-headed youth and not to the older and wiser segment of the driving population.

Future Research of Other Relevant Factors

The Impact of Perceived Fixed Traits on Driving-Related Attributional Processing

As a new area of research, attributional theory in the context of driving can take many research directions. Establishing that an attributional model applies in this context is only the first step. With its roots firmly planted, this line of research can now branch out into any number of topics, and in fact several seeds of empirical investigation have already been planted. For instance, Knapper and Cropley (1981) noted that drivers often attributed qualities or characteristics to other motorists based on fixed traits such as age, sex, and physical appearance. These types of attributions are essentially stereotypes that have spilled over into the driving environment or that have developed specifically in that environment (e.g., "women drivers"; see Berger, 1986; Deaux, 1971).

Glendon et al. (1996) demonstrated driving-related stereotypes based on age and gender. Specifically, participants were asked to respond to a questionnaire pertaining to perceived collision risk and driving-related judgment and skill with respect to themselves and four target groups (i.e., older males, younger males, older females, younger females).

Participants were also asked to rate a series of videotaped driving scenarios with respect to likelihood of collision occurrence and perceived judgment and skill. Male drivers were generally perceived to be more likely to experience a collision than female drivers. Conversely, older drivers were perceived to be less likely to be involved in a collision and scored higher on most performance ratings than did younger drivers. Overall, young males were rated much more likely to experience a collision than were the other three demographic groups.

Researchers have examined the impact of these driving-related stereotypes on roadway anger and aggression, but have found mixed results. Dukes et al. (2001) assessed anger and intended retaliation in response to two written driving scenarios: (a) an offending motorist who had changed lanes at a high rate of speed, nearly colliding with the participant's front fender and (b) an offending motorist who was travelling at a low rate of speed and preventing other vehicles from passing. For each vignette, driver gender, driver age (teens versus 60s), and presence versus absence of a cellular phone were experimentally manipulated. Contrary to predictions, manipulated characteristics of the offending driver failed to predict resulting anger and retaliatory aggression.

Forgas (1976) examined the impact of stereotypes on driver aggression. He conducted a study in four different European countries using the classic Doob and Gross (1968) paradigm, where a research confederate blocks another driver at a signal-controlled intersection. In its early use, this research technique focused on horn-honking latency as a measure of driver aggression. In the study by Forgas, the blocking vehicle in half of the trials displayed the national identification code and national flag of Australia,

whereas in the other half of the trials, the blocking vehicle displayed German symbols. Forgas hypothesized that horn honking latency would be longer for the Australian vehicle, as it represented a neutral national stereotype with minimal salience. The German vehicle, however, was presumed to represent a negative national stereotype throughout most European countries surrounding Germany and would therefore solicit shorter horn-honking latencies. Results supported this hypothesis, and also found that there was no difference in the horn-honking latencies of German participants in response to Australian versus German blocking vehicles, ostensibly because these drivers did not possess the negative German stereotype.

Recent research has also begun to examine the impact of stereotypes on driver attributions. Davies and Patel (2005) conducted a thorough investigation of various car and driver stereotypes and how they impact attributions for a motor vehicle collision. In a preliminary study, Davies and Patel asked participants to rate the perceived aggressiveness of various European car models and various car colours, as well as the perceived aggressiveness of drivers of different ages and genders. The Citroen 2CV and Ford Escort XR3i were identified as the least and the most aggressive vehicles, respectively. Red cars were perceived to be most aggressive, whereas beige cars were perceived to be least aggressive. Young males were rated as the most aggressive drivers, whereas elderly females were rated as the least aggressive. In a subsequent study, a written scenario describing an ambiguously caused motor vehicle collision between two drivers was developed. Using the aggressiveness ratings from the preliminary study, combinations of car and driver characteristics were put together to create a stereotypically

high and stereotypically low aggressive driver, who were then inserted into the written scenario. After reading the scenarios, it was found that participants rated the stereotypically high aggressive driver as more responsible for the collision than the stereotypically low aggressive driver. Participants also estimated that the stereotypically high aggressive driver had been travelling at a higher rate of speed and that at the time of the collision his vehicle was further away from its own side of the road relative to the stereotypically low aggressive driver.

In a study very similar to that of Davies and Patel (2005), Lawrence and Richardson (2005) theorized that a gender bias in the driving environment would impact the qualitative nature of the attributions made for a vehicle collision. Specifically, a collision caused by a female driver would be more likely to be attributed to carelessness or negligence; whereas a collision by a male driver would be more likely to be attributed to driver aggression. In actuality, Reason, Manstead, Stradling, Baxter, and Campbell (1990) found that male drivers were more likely than female drivers to report violations (i.e., deliberate defiance of safe driving practices), whereas female drivers were more likely than male drivers to report driving lapses (i.e., lapses in attention or memory). These findings suggest that the stereotype proposed by Lawrence and Richardson may be based in fact. In line with the study by Davies and Patel, Lawrence and Richardson further theorized that a stereotype regarding vehicle type would interact with this gender bias. The researchers presented participants with a written scenario describing a driver who attempted to make a turn onto another road but who turned in front of and was struck by an oncoming vehicle. The authors experimentally manipulated the gender of the

driver and the type of vehicle that caused the collision. As was done by Davies and Patel, a pilot study was conducted in order to identify a stereotypically aggressive vehicle and a stereotypically non-aggressive vehicle. The BMW 5 series and the Smart Car were selected for the study's aggressive and non-aggressive car types, respectively. After reading the collision scenario and reviewing the crash diagram and photograph of the vehicle involved, participants were asked to respond to a questionnaire regarding their attributions for the collision. As expected, female drivers were judged to be more careless and less aggressive than male drivers, and drivers of BMWs were judged to be more aggressive than drivers of Smart Cars. Moreover, there was an interaction between these two types of attributional bias. When the female motorist was driving a Smart Car, the collision was judged to be the result of driver carelessness more so than with any other combination of driver gender and vehicle type.

To date, the existence of driving-related stereotypes has received only limited research attention, usually focusing on stereotypes concerning age, gender, and vehicle type and examining their impact on the likelihood of a collision or perceived responsibility for a collision. Future studies might consider further empirical investigation of the existence of these and other stereotypes (e.g., ethnicity, status as a tourist or newcomer to the country, etc.). The use of the Implicit Association Test might prove particularly useful in such an endeavour, as participants are sometimes reluctant to reveal the stereotypes to which they ascribe. In addition, the attribution-related findings of Davies and Patel (2005) and those of Lawrence and Richardson (2005) suggest that it might be worthwhile to determine how stereotypes about any number of driver

characteristics might impact attributions for near-collisions or other negative driving encounters beyond actual collisions. Does age, gender, or ethnicity affect attributions? Is this effect strong enough to be found for each of these characteristics alone, or must these demographic variables be combined to create a stereotypically high or low aggressive driver, as was done by Davies and Patel? Based on attributional theory and previously discussed research, it can be assumed that the attributions altered by stereotype-based information would, in turn, influence the resulting anger and aggression associated with the negative driving event. Future research should confirm this implication by conducting research on the impact of stereotypes on attributions, emotions, and behaviours in one complete study. Although a piecemeal approach is appropriate for early investigations, subsequent research should include all components of the phenomenon in one thorough empirical assessment.

Another interesting consideration for stereotype-attribution research might be the impact of driver status. In a now classic research paradigm, Doob and Gross (1968) arranged for a research confederate driving either a high status or a low status vehicle to block another driver at a signal-controlled intersection. Doob and Gross found that when the blocking vehicle was a high status vehicle, blocked drivers were less likely to honk their horns and waited longer to do so (see also Deaux, 1971). In a study using the same methodology, McGarva and Steiner (2000) found that blocked drivers accelerated more quickly from the intersection when they had been blocked by a low status vehicle compared to a high status vehicle. Finally, Diekmann, Jungbauer-Gans, Krassnig, and Lorenz (1996) looked at relative status of the blocking and blocked vehicles. In their

research, the blocking vehicle was always a Jetta Volkswagen, which was assessed as a lower-middle class vehicle. Results of their study indicated that the horn-honking latency decreased with the increasing status of the blocked car. That is, drivers of upper-class vehicles presented shorter horn-honking latencies than did drivers of middle-class vehicles, who presented shorter horn-honking latencies than lower-class vehicles.

Although there has been some controversy over the replicability of the status effect (Bochner, 1971; Chase & Mills, 1973), the more controversial question resulting from these studies is whether horn-honking in the situation of a blocked vehicle is a form of instrumental aggression or affective responding. The inclusion of attributional measures within a similar research paradigm may help to resolve this controversy. As well, an examination of the impact of status on attributions for other types of driving altercations or an assessment of the impact of different types of high status vehicles (e.g., Rolls Royce versus Hummer) could provide significant insight into driver cognitions and stereotypes.

Aside from stereotypes, the characteristics of the offending driver or vehicle may affect driving-related attributions in another way: in-group favouritism and outgroup bias. Wang and McKillip (1978) asked participants from three different groups to take part in a scenario-based study. These represented groups included Chinese students (whose mean length of stay in the United States was approximately three years) and American students from Southern Illinois University at Carbondale, as well as American residents of the town of Carbondale. Participants were asked to read a driving scenario in which one student hit another student's vehicle while driving on an icy road. In one version of the

scenario, the offending driver was Chinese and the victim driver was American. In the second version of the scenario, the ethnicity of the two drivers was reversed, and in the final version of the scenario, no description of driver ethnicity was given. Participants were asked to assign a fine to either the offending driver or the victim and to determine the amount of the fine from zero to fifty dollars. Participants were also asked to rate the personality characteristics of both drivers according to several semantic differential scales. As a control measure, participants also completed a scale of American-Chinese ethnocentrism.

Results indicated that when examining the control scenario with no description of driver ethnicity, all groups tended to assign the fine to the offending driver and to rate the victim more favourably. However, when ethnicity of the two drivers was introduced, Chinese students tended to assign fines to the American motorist, regardless of whether he was in the role of offending driver or victim, whereas American town residents tended to assign fines to the Chinese motorist regardless of whether he was in the role of offending driver or victim. Likewise, the Chinese students rated the personality of the Chinese motorist more favourably than the American motorist, whereas the American town residents did the opposite. Wang and McKillip attributed the lack of discrimination in terms of both fine and personality rating by American student participants to be a clear reflection of their relatively low ethnocentrism.

This study, and others like it outside the realm of driver behaviour (e.g., Kouabenan et al., 2001), suggest that not only do the demographic and fixed traits of other drivers impact our perceptions of them, but so too does their status as ingroup

versus outgroup members. Wang and McKillip (1978) examined the impact of this status on third-party perceptions of a motor vehicle collision and found a clear in-group favouritism bias. Lawrence and Richardson (2005) tested for a gender-based ingroup favouritism bias on third-party perceptions of a motor vehicle collision, but failed to identify the existence of any such bias. Glendon et al. (1996) looked at general ratings of driving competence and collision likelihood, as well as similar ratings of videotaped scenarios. Their results identified a gender-based ingroup favouritism bias whereby the general tendency to perceive male drivers to be more likely to experience a collision was much less among male participants than female participants. An age-based bias (i.e., older versus younger drivers) was also tested; however, no effect was found. Given these limited and contradictory findings, future research will need to identify what conditions are necessary in order for ingroup/outgroup membership to impact attributions, anger, and/or aggression. In light of the findings of Forgas (1976), who found that European drivers were not as quick to honk at a vehicle from a foreign country with a neutral stereotype as they were to honk at a vehicle from a country with a negative stereotype, it may be that ingroup/outgroup membership may only be relevant when either group membership is made salient or a prominent stereotype exists.

The Role of Cognitive Load in Driving-Related Attributional Processing

According to social cognition research, stereotypes can be viewed as a more efficient form of information processing (Allport, 1954; Macrae, Milne, & Bodenhausen, 1994; Tajfel, 1969). As human beings, mentally processing and generating responses to all of the inputs that we receive would require a significant amount of cognitive effort

and would produce considerable mental strain. Stereotypes act as energy-saving devices that simplify the stimuli that we encounter (Macrae et al., 1994). This is why we spontaneously or subconsciously engage stereotypes, particularly when faced with any number of different forms of cognitive load including time urgency, task complexity, and concurrent tasks (Bodenhausen & Lichtenstein, 1987; Macrae et al., 1994). One of the many mental processes that can be facilitated by the use of stereotypes is attribution. Research has found that under conditions of cognitive load, perceivers are less able to utilize situational information when making attributions for an outcome. Instead, they rely on expectations or stereotypes of the actors involved (Kruglanski & Freund, 1983; Nordstrom, Hall, & Bartels, 1998; Reeder, 1997).

Cognitive load takes many forms in the driving environment including crowded but fast-moving traffic, driver stress or driver anger, or dual tasks such as talking on a cellular phone while driving. With so many sources of cognitive load in the driving environment, it is important that research focus not only on the nature of stereotypes that emerge on the roadways, but also examine the conditions that might lead to the activation of stereotypes and their application to driver attributions. Contrary to previous findings, Gilbert and Hixon (1991) argued that cognitive busyness actually reduces the likelihood of stereotype activation, but facilitates stereotype application once activation has occurred. If this is the case in the driving environment, then perhaps stereotyping is not of significant concern in this context. On the other hand, Herzog (1994) suggested that drivers are involved in so many repetitive interactions on a daily basis that they may develop a mindset that other motorists drive as they do because of disposition, a

stereotype regarding the causation of driving altercations. If this is the case then stereotype activation may be inevitable, as any negative driving event would elicit the mindset of a dispositional cause, and as demonstrated by Gilbert and Hixon, stereotype application would be facilitated. These are intriguing questions that future research will need to address. However, it is important to remember that although stereotypes may be tools for more efficient processing, they also lead to a greater number of processing errors. In the driving environment, these errors could lead to increased driver anger and retaliation, making the impact of stereotypes and cognitive load in this context far more grave than elsewhere.

The Role of Individual Differences in Driving-Related Attributional Processing

When Herzog (1994) suggested that drivers exposed to multiple negative interactions may develop an expectation of dispositional causation for all driving-related altercations, he also came very close to describing a recognized individual difference variable known as the hostile attribution bias. According to Nasby, Hayden, and DePaulo (1980), the hostile attribution bias is a tendency to infer hostile intent by others involved in interpersonal confrontations. Early studies of hostile attribution bias examined its role in social maladjustment in children, including aggressive child behaviour (see Crick & Dodge, 1994). In one such study, for example, Dodge and Newman (1981) reported that aggressive elementary school-aged boys overattributed hostility to their peers, made these decisions more quickly with less reliance on available social cues, and recalled more negative cues from the past in assessing the current situation, relative to non-aggressive boys.

In 2002, Matthews and Norris applied the concept of hostile attribution bias to the driving environment. They developed various driving scenarios designed to imply malicious or benign intent or to be ambiguous in this regard. After reading each scenario, participants were asked to rate the intentionality of the driver's actions, their certainty that the driver's actions were hostile, and their degree of anger if they had been the victim of this negative driving event. Results indicated that drivers who scored high on a measure of trait aggressiveness attributed greater hostility than did low trait aggressive drivers, but only in the ambiguous scenario.

As mentioned previously, Yagil (2001) conducted a similar scenario-based study in which she measured preference for attributions of hostile intent and preference for aggressive responding in those written scenarios. She also measured participants' aggregate image of other drivers by rating them on a series of descriptive adjectives such as 'careful', 'courteous', 'selfish', and 'aggressive'. Yagil found that participants who held a more negative image of drivers in general perceived greater hostility in the intentions of the drivers described in the written scenarios. A negative driver image was also found to be related to driver irritability which contributed to greater aggressive responding.

These findings concerning hostile attribution bias beg the question of how this and other individual difference or personality variables might influence Weiner's (1995, 1996) attributional model of social conduct. Weiner himself has suggested that those high in trait aggression are likely to possess a hostile attribution bias that may influence their inferences about the responsibility of perceived offenders (Weiner, 1995). Yet, are there

other individual difference variables that may impact the cognitive-emotional-behavioural sequence outlined by Weiner? In the driving context, there is already a mountain of empirical research demonstrating the relationship between a diverse set of individual difference variables and driver anger and/or aggression. Beyond the studies of hostile attribution bias, research has identified impulsivity (Dahlen, Martin, Ragan, & Kuhlman, 2005; Deffenbacher et al., 2005; Deffenbacher, Filetti, et al., 2003; DePasquale, Geller, Clarke, & Littleton, 2001; Wickens, Toplak, & Wiesenthal, 2008), narcissism (Lustman, Wiesenthal, & Flett, in press; Schreer, 2002), Type A behaviour (Blanchard, Barton, & Malta, 2000; Li, Li, Long, Zhan, & Hennessy, 2004; Miles & Johnson, 2003; Perry, 1986; Perry & Baldwin, 2000; Shahidi, Henley, Willows, & Furnham, 1991), trait anger (Björklund, 2008; Dahlen et al., 2005; Dahlen & Ragan, 2004; Deffenbacher et al., 2000, 2001, 2004, 2005; Deffenbacher, Deffenbacher, et al., 2003; Deffenbacher, Filetti, et al., 2003; Deffenbacher, Lynch, et al., 2003; Dukes et al., 2001; Galovski & Blanchard, 2002; Lajunen & Parker, 2001; Li et al., 2004; Malta et al., 2001; Mesken et al., 2007; Nesbit et al., 2007; Schwebel, Severson, Ball, & Rizzo, 2006; Yasak & Esiyok, 2009), trait anxiety (Deffenbacher et al., 2000; Deffenbacher, Lynch, et al., 2003; Galovski & Blanchard, 2002; Shahar, 2009; Yasak & Esiyok, 2009), sensation seeking (Dahlen et al., 2005; Matthews et al., 1999; Rimmö & Åberg, 1999; Schwebel et al., 2006; Trimpop & Kirkcaldy, 1997), trait driver stress (Hennessy & Wiesenthal, 2001a; Li et al., 2004; Westerman & Haigney, 2000), hypermasculinity/"machoism" (Krahé & Fenske, 2002), and the Big Five personality traits (i.e., extraversion, agreeableness, conscientiousness, neuroticism, openness; Miles & Johnson, 2003; Sümer,

Lajunen, & Özkan, 2005) as predictors of driver anger and/or aggression, just to name a few. In addition, more positive characteristics such as trait forgiveness and consideration of future consequences have been found to be negatively related to driver anger and the expression of this anger (Moore & Dahlen, 2008). The question does not seem to be whether or not individual difference variables can further refine the application of Weiner's model to the driving environment, but rather which components of the model are influenced by these variables. Do individual difference variables impact the nature of the attributions made, intensify the experience of the emotions felt, or alter our decisions regarding whether or not to behaviourally express these emotions? To date, there is some support for each of these means of influence.

Focusing on the emotional and behavioural components first, it is clear that personality and individual difference variables influence these responses toward offending motorists. In terms of driver anger, it is likely that influential personality variables serve to lower the driver's anger threshold, thereby expanding the types of events that elicit driver anger. One such personality construct is trait anger, which by definition is "a general temperament of low threshold reactivity in which angry feelings are experienced in response to a very wide variety of relatively innocuous triggers" (Ramírez & Andreu, 2006, p. 280). It seems extremely logical to assume that high trait anger likely impacts the emotional response component of Weiner's (1995, 1996) model by lowering drivers' anger threshold in response to negative driving events. Consistent with this interpretation, trait driver anger has been found to result in more frequent and intense state anger (Deffenbacher et al., 2000, 2001, 2005; Deffenbacher, Deffenbacher,

et al., 2003; Deffenbacher, Filetti, et al., 2003; Deffenbacher, Lynch, et al., 2003; Lajunen & Parker, 2001; Mesken et al., 2007).

Other variables may perform the same function. Smith, Waterman, and Ward (2006) examined driver anger and aggression among members of the public as well as criminal offenders. Although the researchers did not measure trait anger, which was likely to differ between the samples, researchers did note that offenders scored higher on measures of trait aggression and impulsivity than did members of the public. Both groups were asked to complete the Driving Anger Scale (DAS), which presents respondents with a series of potentially anger-provoking events and asks them to indicate their degree of anger should they actually encounter these events. Results of the study indicated that offenders scored significantly higher on the DAS than members of the general public, suggesting that these impulsive and trait aggressive offenders may have a low anger threshold in response to relatively mundane driving events.

Aggressive driver behaviour may be influenced by individual differences in a variety of different ways. For instance, in Smith et al.'s (2006) study, they also asked both groups to rate the perceived level of aggression and severity of various acts of road rage. Results indicated that offenders consistently viewed acts of driver aggression as less severe than did members of the general public, suggesting that impulsive and trait aggressive offenders tend to view aggression as a legitimate behavioural response. Given this more accepting view, there is a greater likelihood of escalation when these offenders are involved in driving altercations. Lustman et al. (in press) examined the impact of narcissism on anticipated anger and aggression in response to various driving scenarios.

Although participants who scored higher on narcissism did not report greater anger, their aggressive responding did appear to interact with their level of anger. Specifically, once their anger reached a certain threshold, the anger of high narcissism participants progressed more easily into aggression than did that of low narcissism participants. The authors suggested that perhaps narcissists experience a greater need to respond aggressively in response to anger, or experience less inhibition once that threshold level of anger is reached. They may also judge there to be a greater deservingness of punishment, as they tend to judge both themselves and others harshly.

What about the impact of personality and individual difference variables on the attributions made for negative driving events? Several studies of attribution outside the realm of driver behaviour have already demonstrated that individual difference variables can impact the nature of the attributions made. For instance, Block and Funder (1986) identified social competence (including intelligence, verbal fluency, ambition, generosity, empathy, etc.) as predictive of which participants were most likely to commit the attributional biases of social role effect and attributional generosity. Duff and Newman (1997) found that idiocentrism (i.e., the individual difference that corresponds to the broader cultural concept of individualism as opposed to collectivism) is associated with making fewer spontaneous inferences about situational information and more spontaneous trait inferences. Despite significant study of the impact of individual difference variables on attribution generally, very little such research has been conducted in the driving environment.

In one of the few studies shedding light on this research question, Lustman et al. (in press) found that high narcissism compared to low narcissism participants assigned higher levels of perceived intent to the offending motorist described in a short written scenario. The authors suggested that this may result from the extremely high standards that narcissists use to judge both others and themselves. When narcissists fail to meet their own high standards, feelings of inadequacy can result; yet when these standards are applied to others, narcissists need not risk the negative consequences to their self-esteem. Thus they are more motivated to judge other drivers more severely, using more dispositional attributions. Strangely, although high narcissism participants in this study attributed greater intentionality to the offending driver, they did not experience greater anger in response to the offender, which does not fit with Weiner's (1995, 1996) model.

Perhaps the most systematic study of how personality influences driver attributions and the resulting emotional and behavioural responses was conducted by Britt and Garrity (2006). As mentioned previously, these researchers conducted a study in which they asked participants to recall three different driving events and, subsequently, to make attributions for the offending driver's behaviour, to rate their degree of anger toward that driver, and to report their aggressive driver behaviours in response to that driver. Following these procedures, Britt and Garrity also asked participants to complete a series of personality questionnaires, ostensibly for an unrelated research study. The authors then tested for mediation to determine if attribution mediated the relationship between personality and driver anger or aggression. Although multiple personality variables were included in the study, in only a few cases were the conditions for a test of

mediation met (i.e., if a given personality variable accounted for unique variance in the anger or aggression reported in a given driving scenario, then the personality variable must also be correlated with one of the attributions that accounted for unique variance in the anger or aggression reported in that same driving scenario). There was no evidence of full mediation; however, partial mediation was demonstrated for anger and aggressive behaviour in the cut-off situation. Specifically, hostile attributions partially mediated the relationship between trait physical aggressiveness and aggressive behaviour in response to the offending motorist, and stability attributions partially mediated the relationship between trait hostility and anger towards the offending motorist.

Finally, in addition to determining which individual difference variables influence which components of Weiner's (1995, 1996) model and how, it may also be important to identify the conditions needed for this interaction between situation and personality to take place. Previous research has hinted that ambiguity may be the key (Gilbert, McNulty, Giuliano, & Benson, 1992). Matthews and Norris (2002) developed written scenarios that were construed by participants as being either benign, ambiguous, or malign by their degree of perceived provocation. The researchers found that high trait aggressive individuals attributed greater hostility to the offending driver in the written scenarios, but only for the ambiguous driving conditions. This suggests that under conditions of uncertainty, high trait aggressive drivers will err on the side of more dispositional attributions. Under these same conditions, low trait aggressive drivers showed almost no bias for intent. Therefore, the less aggressive individuals could

perceive intent in the ambiguous scenarios, but they were less likely to commit to a strong attribution of hostility and therefore experienced less anger.

Assimilating Weiner's Model into a More Integrative Framework

The potential directions for future research in this field are unquestionably vast, and they include the consideration of multiple new variables of interest. Weiner's (1995, 1996) attributional model of social conduct is a process-grounded versus content-grounded theory, meaning that it generalizes across a diverse set of psychological phenomena including achievement evaluation, the judgment of stigmatized persons, helping behaviour, and aggression (Weiner, 1996). Clearly, one of its primary strengths is its parsimony. Yet, it must be asked how Weiner's model will account for the innumerable new factors that future researchers will consider. How will it accommodate the potential influence of individual difference variables or cognitive load? It seems reasonable to assume that an extension of Weiner's model or a more integrative framework will need to be considered.

Within the aggression context, the General Aggression Model (GAM; Anderson & Bushman, 2002) is a more integrative framework that may help to incorporate new variables of interest. The GAM has three stages: (a) person and situation inputs, (b) the present internal state created by the person and situation input variables (i.e., the interplay of affect, cognition, and arousal), and (c) outcomes of the information processing that occurs in response to the present internal state. The attribution process described in Weiner's (1995, 1996) model fits within the outcome portion of the GAM where appraisals of aggressive acts and decisions regarding behavioural responses are

formulated. According to the GAM, elements of the person (e.g., traits, gender, beliefs, attitudes, values, long-term goals, scripts) and elements of the situation (e.g., aggressive cues, provocation, frustration, pain and discomfort, drugs, incentives) influence cognition, affect, and arousal, which are all factors that contribute to our internal state. The input variables may make hostile thoughts or aggressive scripts more accessible, increase levels of anger or negative mood, or heighten either physical or psychological arousal, all of which interact to create one's present internal state. The final outcome phase includes complex information processing. The input variables, as influenced by the present internal state, are subjected to immediate and automatic appraisal. This can be likened to the assessment of causal dimensionality described by Weiner. The immediate appraisal could include anger, a retaliation goal, and an intention to carry out this goal; however, the resources available to the perceiver (e.g., time, cognitive capacity) will determine if the perceiver responds impulsively and in line with the immediate appraisal or if the perceiver reappraises the situation and responds with thoughtful action. A responsibility judgment likely parallels the reappraisal portion of the GAM's outcome stage, suggesting again that a judgment of responsibility may not be necessary for the application of Weiner's model to the driving context. According to the GAM, an aggressive response is possible with both the impulsive and the thoughtful action.

Weiner's (1995, 1996) attributional theory of social conduct and the GAM (Anderson & Bushman, 2002) are not at odds. Weiner's model merely fits within the more expansive framework of the GAM. Continued research using Weiner's model could certainly prove fruitful, particularly in terms of understanding the precise nature of causal

attributions and judgments of responsibility as they relate to driver anger and aggression. Weiner's model should contribute to our understanding of why certain driving behaviours are perceived as more offensive than others. However, when examining how additional factors may influence the attributional process, the GAM can provide a means of integrating these concepts within a single theoretical framework.

Attribution Theory as a Means to Improved Driver Safety

When attribution theory has been applied to the driving environment, results have indicated that drivers choose to explain the erroneous or negative behaviour of other roadway users by relying on stable and dispositional attributions. Yet when explaining their own behaviour, drivers prefer to rely on situational attributions, citing unstable circumstance as the primary cause of their own driving errors (Arkkelin et al., 1979; Baxter et al., 1990; Harré et al., 2004; Hennessy & Jakubowski, 2007; Herzog, 1994; Moyano-Díaz, 1997). Motorists also tend to severely overestimate their own driving skills and abilities, rating themselves as well above average in terms of driver safety (DeJoy, 1989; Delhomme, 1991; Finn & Bragg, 1986; Goszczyńska & Rosłan, 1989; Groeger & Grande, 1996; Harré & Sibley, 2007; Matthews & Moran, 1986; McCormick, Walkey, & Green, 1986; McKenna, Stanier, & Lewis, 1991; Mynttinen et al., 2009; Svenson, 1981). Consistent with Weiner's (1995, 1996) attributional model of social conduct, these attributional biases have been found to contribute to more risky and aggressive driving (Finn & Bragg, 1986; Knapper & Cropley, 1978; Matthews & Moran, 1986; Svenson, 1981), resulting in motor vehicle injuries and even fatalities. These

research findings clearly indicate the need to resolve these misperceptions and attributional biases.

Drivers need to be reminded that, like themselves, other motorists can also make unintended errors that are not necessarily typical of their normal driving behaviour (Baxter et al., 1990; Herzog, 1994). Drivers also need to be encouraged to make the effort to look for possible situational determinants of seemingly offensive driver behaviour (Ellwanger, 2007). Conversely, drivers need to consider that their own driving behaviours may be perceived as offensive, and may elicit anger and/or aggression from other road users (Baxter et al., 1990; Herzog, 1994). When recognizing that other motorists suffer from the same attributional biases as themselves, drivers may be more likely to acknowledge their own driving error and to communicate its unintended nature (e.g., with a wave), thereby reducing the likelihood that the victim motorist will respond with anger and/or aggression (Ellwanger, 2007). It may also be beneficial for drivers, particularly young drivers, to realize that they are overestimating their own driving skills and abilities. More experienced drivers may not benefit from this type of attempt to adjust their self-perception, as they have spent years developing their driver identity (Groeger & Grande, 1996). For young motorists, however, they have not invested as much of their self-esteem into their driver identity. Therefore, they may be more amenable to lasting change, and it may be worthwhile to help them to realize that they are not as skilful a driver as they might believe. Young motorists tend to think that their peers engage in more risky driving behaviour and that they do it for the sake of showing off. Perhaps, the

key is to encourage these young motorists to realize that they themselves are committing just as many risky manoeuvres and for exactly the same reasons (Harré et al., 2004).

Based on these ideals, researchers have suggested initiating education campaigns and driver training programs designed to sensitize drivers to their misperceptions and attributional biases (Baxter et al., 1990; Britt & Garrity, 2003; Ellwanger, 2007; Harré et al., 2004; Herzog, 1994; Matthews & Norris, 2002). For instance, the public service campaign entitled 'Give 'em A Brake' encourages courtesy and patience for road construction workers (Ellwanger, 2007). It asks drivers to view construction delays as necessary and legitimate rather than the result of apathetic and unmotivated construction crews. By altering drivers' perceptions of and attributions for the delays, the campaign may be reducing the amount of stress and frustration experienced by motorists and may therefore reduce the chance of aggressive and risky driving that could endanger both motorists and construction crews. Similar campaigns could be developed to alter driver perceptions of and attributions for the negative driving behaviours and errors committed by other motorists. Likewise, driver attribution training programs could be developed and focused on making drivers aware of their cognitive biases in explaining their own and others' driver behaviours. These programs could also focus on teaching drivers about how to communicate their intentions both before (e.g., using lane change and turn signals) and after (e.g., waving to indicate an apology or a sign of gratitude) a driving manoeuvre in order to reduce the chances of a miscommunication escalating into an aggressive episode. This may be particularly worthwhile given Renge's (2000) finding that novice drivers encounter more difficulty than experienced drivers in comprehending

informal signals commonly used in the driving environment (e.g., flashing headlights as a signal of thanks).

Other researchers have recommended that a forgiveness component be added to any retraining program. For instance, Moore and Dahlen (2008) found that the positive dispositional characteristics of trait forgiveness and consideration of future consequences were negatively associated with aggressive driving and driving anger expression, independent of driver anger. The authors concluded that driver education programs might benefit from curriculum devoted to the promotion of forgiveness in the driving environment, citing previous success in general anger reduction with forgiveness-based treatments (see Fitzgibbons, 1986; Lin, Mack, Enright, Krahn, & Baskin, 2004).

Takaku (2006) utilized a different model to examine attributions in the driving environment. The dissonance-attribution model of interpersonal forgiveness is derived from Weiner's attributional theory (1985, 1992, 1995) and the theory of cognitive dissonance (Festinger, 1957). According to this model, attempting to take the perspective of the offending driver may not be sufficient in restricting the victim driver's anger and aggressive retaliation to a negative driving event. Instead, victim drivers must remind themselves of their own driving errors and negative actions. When angered by the errors or actions of others, reminding themselves of their own errors creates a hypocritical or inconsistent cognition that is associated with dissonance-like discomfort. In order to reduce the hypocrisy dissonance, victim drivers are forced to look for other possible causes for the negative event beyond dispositional ones. By altering the attributions made, the emotional response becomes more positive and a forgiveness response more

likely. Takaku tested this model (including assessments of controllability, locus of causality, and stability, but not including responsibility) by having participants watch a videotape of a driver being cut off in traffic and asking participants to identify with this motorist. In the treatment condition, this driver committed the same offensive act himself before being cut off by another motorist.

Results indicated that participants who viewed the driver committing a similar offence before being victimized by an offending driver were more likely to experience hypocrisy-induced dissonance and to make less internal and less stable attributions for the offending motorist's behaviour. Path analysis was used to examine the relationships between all constructs. None of the paths from hypocrisy dissonance to negative behavioural intention (i.e., the degree to which participants hoped that something negative would befall the offending driver) passed through the casual dimensions used to make attributions; however, there was a direct path from hypocrisy dissonance to negative behavioural intention and another path that passed through negative emotions. In terms of the paths from hypocrisy dissonance to interpersonal forgiveness, there was one path that passed through locus of causality, another that passed through negative emotions and one direct path. Takaku suggested that the lack of a path through the causal dimensions to negative behavioural intention may indicate that this negative behavioural response is driven primarily by negative affect whereas intention to forgive requires more elaborate cognitive effort. When driving altercations can occur within a split second, this assessment is highly probable. Interestingly, positive emotions were not related to negative behavioural intention or interpersonal forgiveness. Nonetheless, the results

provide support for many of the relationships described in the dissonance-attribution model of interpersonal forgiveness.

Takaku's findings concerning the potential value of forgiveness in the driving environment mirror the results of the current study regarding prosocial thoughts. Both of these studies suggest that positive behavioural responses, whether they be in the form of forgiveness, helping behaviour, or simply an inhibition of aggressive retaliation, can exist in the driving environment and should be encouraged. Based on these results, the inclusion of a forgiveness component in driver education may be worthwhile.

Conclusion

The results of this research confirm that the study of driver anger and aggression benefits greatly from the inclusion of attributional considerations. Using both a written scenario methodology and a driving diary methodology, the current research demonstrated that Weiner's (1995, 1996) attributional model of social conduct applies well to the driving environment. Our perceptions concerning the controllability and intentionality of another motorist's driving behaviour, and our perception of whether or not this action occurred because of something related to that driver as opposed to something in the environment, influences the degree to which we hold that driver responsible for his or her actions. Our judgments of responsibility dictate whether we experience anger or sympathy, and the valence of our emotions determines whether we respond with aggressive or prosocial behaviour. Although these findings will need to be replicated and explored further with additional samples, methodologies, and more refined measures, the current research provides a strong basis for the continued examination of

attributions in the driving environment. The potential growth for this area of study is profound; there are countless directions that this research can take. Relevant factors and variables include stereotyping, ingroup favouritism, cognitive overload, and a multitude of individual difference variables. Moreover, this research can be used to develop public service campaigns and driver education and training programs that can improve driver safety worldwide. Given the thousands of injuries and casualties attributed to driver aggression each year and the millions of dollars lost as a result, this research and the lines of investigation that will develop from it should become a primary concern of driving safety researchers worldwide.

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Table 1

Study 1: Factor Structure Matrix of Controllability and Intentionality Items

	Factor	
Item # and Intended Factor	1	2
1 (Controllability)	.791	.430
2 (Controllability)	.878	.511
3 (Controllability)	.876	.403
4 (Controllability)	.825	.315
5 (Controllability)	.792	.447
6 (Intentionality)	.432	.858
7 (Intentionality)	.389	.912
8 (Intentionality)	.544	.785
9 (Intentionality)	.408	.882

Table 2

Study 1: Factor Pattern Matrix of Controllability and Intentionality Items

	Factor	
Item # and Intended Factor	1	2
1 (Controllability)	.767	.048
2 (Controllability)	.829	.099
3 (Controllability)	.897	-.043
4 (Controllability)	.888	-.127
5 (Controllability)	.757	.070
6 (Intentionality)	.006	.855
7 (Intentionality)	-.086	.955
8 (Intentionality)	.204	.684
9 (Intentionality)	-.041	.903

Table 3

Study 1: Reliability Analysis (n = 216)

Variable	Number of Items	α	Mean	*SD*
Controllability	5	.915	4.73	1.42
Intentionality	4	.915	3.23	1.52
Locus of Causality	6	.887	3.64	1.32
Responsibility	4	.752	4.49	1.27
Anger	5	.936	4.48	1.40
Sympathy/Concern	3	.911	3.12	1.33
Aggressive Behaviour	5	.829	3.50	1.39
Prosocial Behaviour	3	.700	3.57	1.45

Table 4

Study 1: Factor Pattern Matrix of Locus of Causality and Stability Items

Item # and Intended Factor	Factor
1 (Locus of Causality)	.798
2 (Locus of Causality)	.569
3 (Locus of Causality)	.836
4 (Locus of Causality)	.581
5 (Locus of Causality)	.737
6 (Locus of Causality)	.839
7 (Stability)	.618
8 (Stability)	.746
9 (Stability)	.809
10 (Stability)	.771

Table 5

Study 1: Factor Pattern Matrix of Locus of Causality Items

Item #	Factor
1	.857
2	.539
3	.912
4	.581
5	.793
6	.850

Table 6

Study 1: Factor Pattern Matrix of Responsibility Items

Item #	Factor
1	.805
2	.641
3	.808
4	.413

Table 7

Study 1: Factor Structure Matrix of Anger and Sympathy/Concern Items

	Factor	
Item # and Intended Factor	1	2
1 (Anger)	.882	-.470
2 (Anger)	.856	-.441
3 (Anger)	.885	-.462
4 (Anger)	.868	-.424
5 (Anger)	.828	-.443
6 (Sympathy/Concern)	-.488	.838
7 (Sympathy/Concern)	-.471	.914
8 (Sympathy/Concern)	-.420	.893

Table 8

Study 1: Factor Pattern Matrix of Anger and Sympathy/Concern Items

	Factor	
Item # and Intended Factor	1	2
1 (Anger)	.870	-.023
2 (Anger)	.855	-.002
3 (Anger)	.880	-.010
4 (Anger)	.883	.030
5 (Anger)	.815	-.025
6 (Sympathy/Concern)	-.079	.797
7 (Sympathy/Concern)	-.003	.912
8 (Sympathy/Concern)	.052	.919

Table 9

Study 1: Factor Structure Matrix for Aggressive and Prosocial Behaviour Items

	Factor		
Item # and Intended Factor	1	2	3
1 (Aggressive Behaviour)	.443	-.017	.163
2 (Aggressive Behaviour)	.832	-.207	.243
3 (Aggressive Behaviour)	.871	-.177	.351
4 (Aggressive Behaviour)	.855	-.235	.398
5 (Aggressive Behaviour)	.502	-.303	.384
6 (Aggressive Behaviour)	.141	-.022	.324
7 (Aggressive Behaviour)	.299	-.181	.998
8 (Aggressive Behaviour)	.390	-.246	.667
9 (Prosocial Behaviour)	-.185	.290	-.025
10 (Prosocial Behaviour)	-.172	.968	-.232
11 (Prosocial Behaviour)	-.149	.846	-.178

Table 10

Study 1: Factor Pattern Matrix for Aggressive and Prosocial Behaviour Items

	Factor		
Item # and Intended Factor	1	2	3
1 (Aggressive Behaviour)	.461	.092	.009
2 (Aggressive Behaviour)	.862	-.038	-.097
3 (Aggressive Behaviour)	.868	.031	.025
4 (Aggressive Behaviour)	.820	-.026	.076
5 (Aggressive Behaviour)	.390	-.164	.192
6 (Aggressive Behaviour)	.030	.068	.330
7 (Aggressive Behaviour)	-.090	-.062	1.048
8 (Aggressive Behaviour)	.146	-.062	.595
9 (Prosocial Behaviour)	-.161	.279	.107
10 (Prosocial Behaviour)	.059	.980	-.007
11 (Prosocial Behaviour)	.043	.862	.023

Table 11

Study 1: Factor Structure Matrix for Minor Aggressive and Prosocial Behaviour Items

	Factor	
Item # and Intended Factor	1	2
1 (Minor Aggressive Behaviour)	.447	-.007
2 (Minor Aggressive Behaviour)	.819	-.185
3 (Minor Aggressive Behaviour)	.868	-.152
4 (Minor Aggressive Behaviour)	.865	-.216
5 (Minor Aggressive Behaviour)	.505	-.288
6 (Prosocial Behaviour)	-.182	.279
7 (Prosocial Behaviour)	-.174	.961
8 (Prosocial Behaviour)	-.153	.858

Table 12

Study 1: Factor Pattern Matrix for Minor Aggressive and Prosocial Behaviour Items

	Factor	
Item # and Intended Factor	1	2
1 (Minor Aggressive Behaviour)	.466	.091
2 (Minor Aggressive Behaviour)	.815	-.015
3 (Minor Aggressive Behaviour)	.874	.031
4 (Minor Aggressive Behaviour)	.857	-.037
5 (Minor Aggressive Behaviour)	.465	-.190
6 (Prosocial Behaviour)	-.129	.252
7 (Prosocial Behaviour)	.028	.967
8 (Prosocial Behaviour)	.028	.864

Table 13

Study 1: Bivariate Correlations ($n = 214$)

	1.	2.	3.	4.	5.	6.	7.	8.
1. Controllability	-							
2. Intentionality	.49	-						
3. Locus of Causality	.74	.65	-					
4. Responsibility	.79	.57	.74	-				
5. Anger	.53	.54	.57	.57	-			
6. Sympathy	-.62	-.50	-.59	-.57	-.51	-		
7. Aggressive Behaviour	.36	.44	.48	.43	.63	-.40	-	
8. Prosocial Behaviour	-.45	-.31	-.40	-.28	-.28	.53	-.22	-

$p \leq .001$

Table 14

Study 1: Descriptive Statistics for Assessment of Gender Effects

	Males (n = 63)			Females (n = 151)		
	Mean	SD	Median	Mean	SD	Median
Controllability	4.77	1.65	5.00	4.73	1.33	5.00
Intentionality	2.93	1.58	2.50	3.38	1.49	3.25
Locus of Causality	3.61	1.49	3.67	3.65	1.25	3.50
Responsibility	4.41	1.46	4.50	4.53	1.19	4.50
Anger	4.15	1.61	4.60	4.63	1.27	4.80
Sympathy	3.22	1.56	3.00	3.08	1.22	3.00
Aggressive Behaviour	3.61	1.63	3.60	3.48	1.28	3.40
Prosocial Behaviour	3.28	1.75	3.33	3.70	1.29	3.67

Table 15

Study 2: Factor Structure Matrix for Aggressive and Prosocial Thought Items

	Factor	
Item # and Intended Factor	1	2
1 (Aggressive Thought)	.291	-.074
2 (Aggressive Thought)	.571	-.191
3 (Aggressive Thought)	.849	-.115
4 (Aggressive Thought)	.762	-.111
5 (Aggressive Thought)	.549	-.093
6 (Prosocial Thought)	.177	.137
7 (Prosocial Thought)	-.193	.911
8 (Prosocial Thought)	-.165	.973

Table 16

Study 2: Factor Pattern Matrix for Aggressive and Prosocial Thought Items

	Factor	
Item # and Intended Factor	1	2
1 (Aggressive Thought)	.287	-.022
2 (Aggressive Thought)	.555	-.092
3 (Aggressive Thought)	.856	.038
4 (Aggressive Thought)	.767	.026
5 (Aggressive Thought)	.550	.005
6 (Prosocial Thought)	.208	.174
7 (Prosocial Thought)	-.032	.905
8 (Prosocial Thought)	.009	.975

Table 17

Study 2: Reliability Analysis (n = 199)

Variable	Number of Items	α	Mean	*SD*
Controllability	5	.825	6.30	0.98
Intentionality	4	.902	4.95	1.73
Locus of Causality	6	.581	4.98	1.00
Responsibility	4	.671	5.80	1.15
Anger	5	.938	5.53	1.29
Sympathy/Concern	3	.828	1.93	1.03
Aggressive Behaviour	5	.723	2.61	1.48
Prosocial Behaviour	1	-	1.66	1.49
Aggressive Thoughts	5	.738	4.41	1.56
Prosocial Thoughts	3	.661	3.25	1.61

Table 18

Study 2: Bivariate Correlations (n = 194)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Controllability	-									
2. Intentionality	.15[a]	-								
3. Locus of Causality	.38[c]	.30[c]	-							
4. Responsibility	.51[c]	.33[c]	.48[c]	-						
5. Anger	.27[c]	.25[c]	.25[c]	.52[c]	-					
6. Sympathy	-.41[c]	-.34[c]	-.33[c]	-.42[c]	-.44[c]	-				
7. Aggressive Thoughts	.17	.20[b]	.12	.30[c]	.60[c]	-.19[b]	-			
8. Prosocial Thoughts	-.20[b]	-.20[b]	-.16[a]	-.14	-.08	.27[c]	-.04	-		
9. Aggressive Behaviour	-.09	.12	.09	.09	.31[c]	.03	.57[c]	.10	-	
10. Prosocial Behaviour	-.27[c]	.08	-.13	-.13	.02	.08	.12	.32[c]	.38[c]	-

[a] $p < .05$

[b] $p < .01$

[c] $p < .001$

Table 19

Study 2: Descriptive Statistics for Assessment of Gender Effects

	Males (n = 57)			Females (n = 137)		
	Mean	SD	Median	Mean	SD	Median
Controllability	6.19	1.04	6.60	6.43	0.71	6.80
Intentionality	4.95	1.81	5.25	4.97	1.71	5.25
Locus of Causality	5.04	1.08	5.00	4.98	0.93	4.83
Responsibility	5.84	1.10	6.00	5.89	1.03	6.00
Anger	5.21	1.38	5.40	5.71	1.20	6.00
Sympathy	2.04	1.10	1.67	1.82	0.89	1.67
Aggressive Thoughts	4.42	1.57	4.40	4.48	1.52	4.80
Prosocial Thoughts	3.14	1.56	3.00	3.23	1.63	3.33
Aggressive Behaviour	2.78	1.52	2.60	2.59	1.46	2.20
Prosocial Behaviour	1.82	1.57	1.00	1.55	1.37	1.00

Figure 1

Weiner's Attributional Theory of Social Conduct

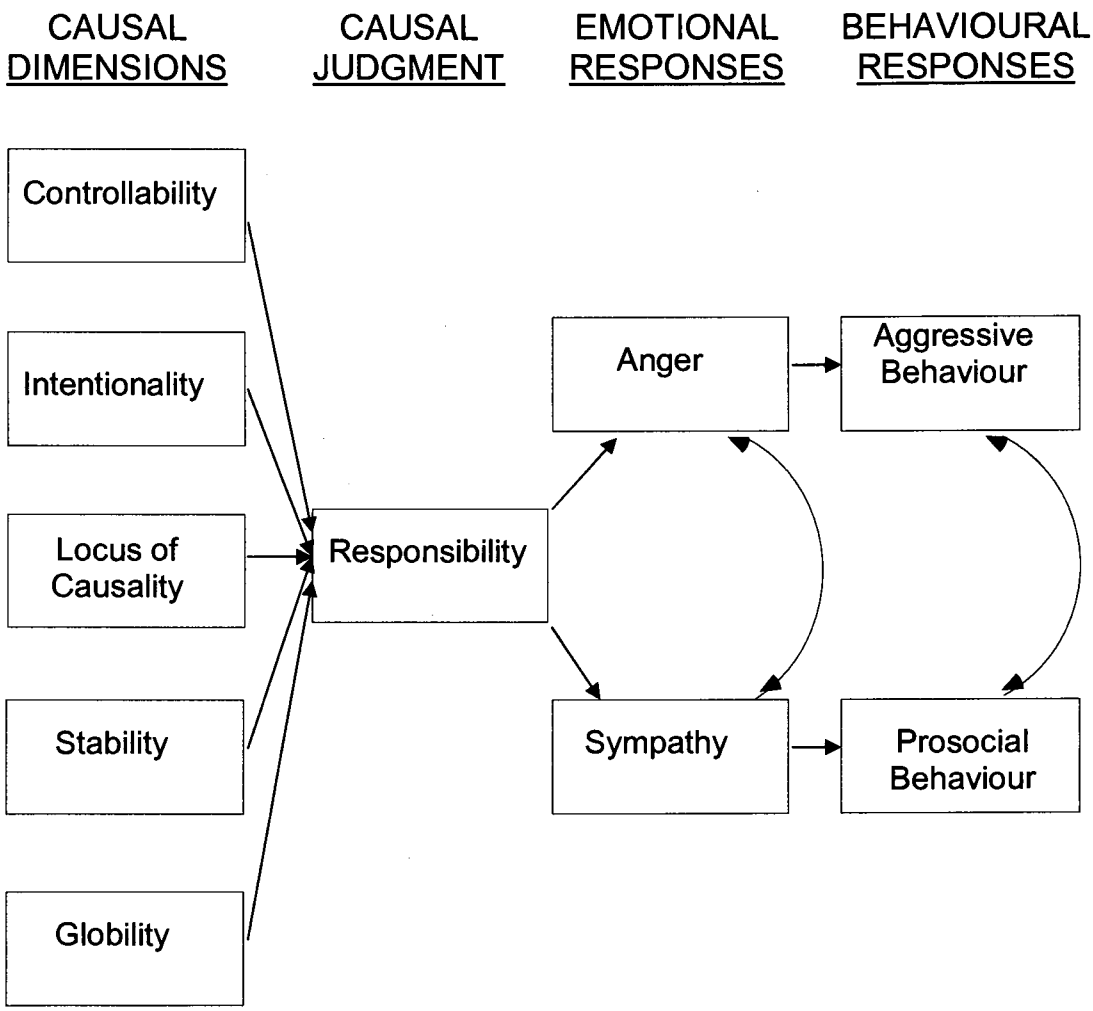


Figure 2

Study 1: Mean Controllability Scores as a Function of Group

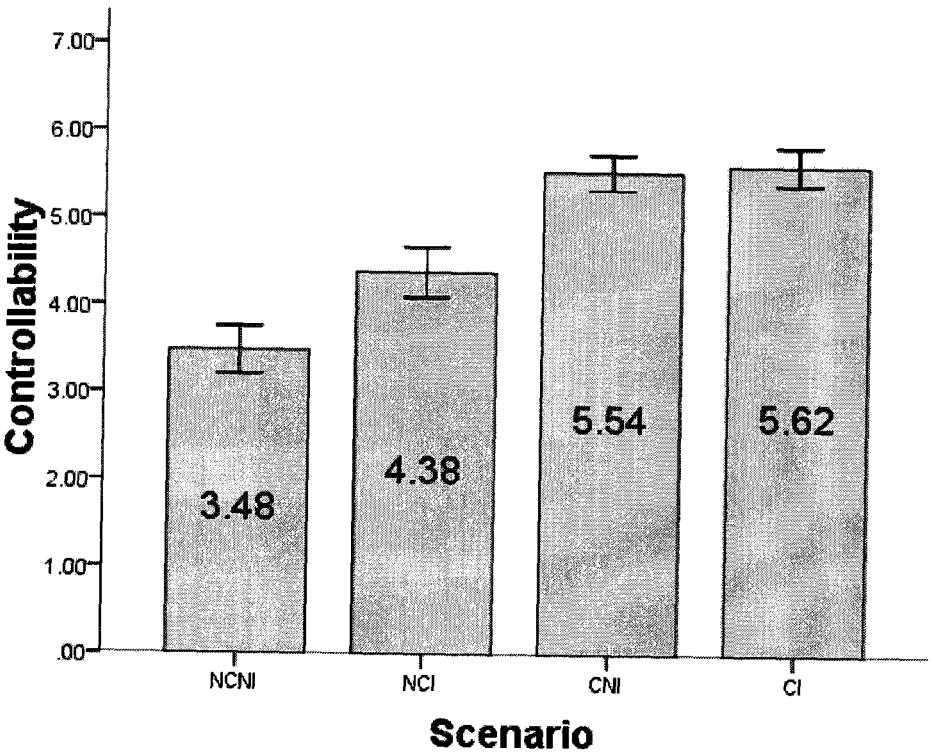


Figure 3

Study 1: Mean Intentionality Scores as a Function of Group

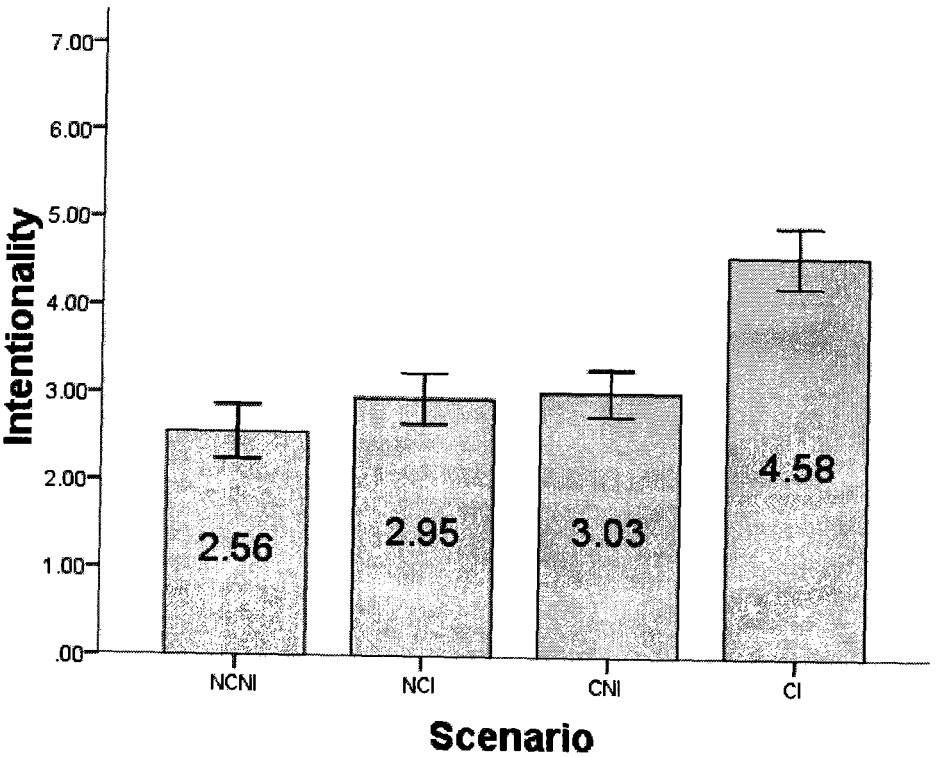
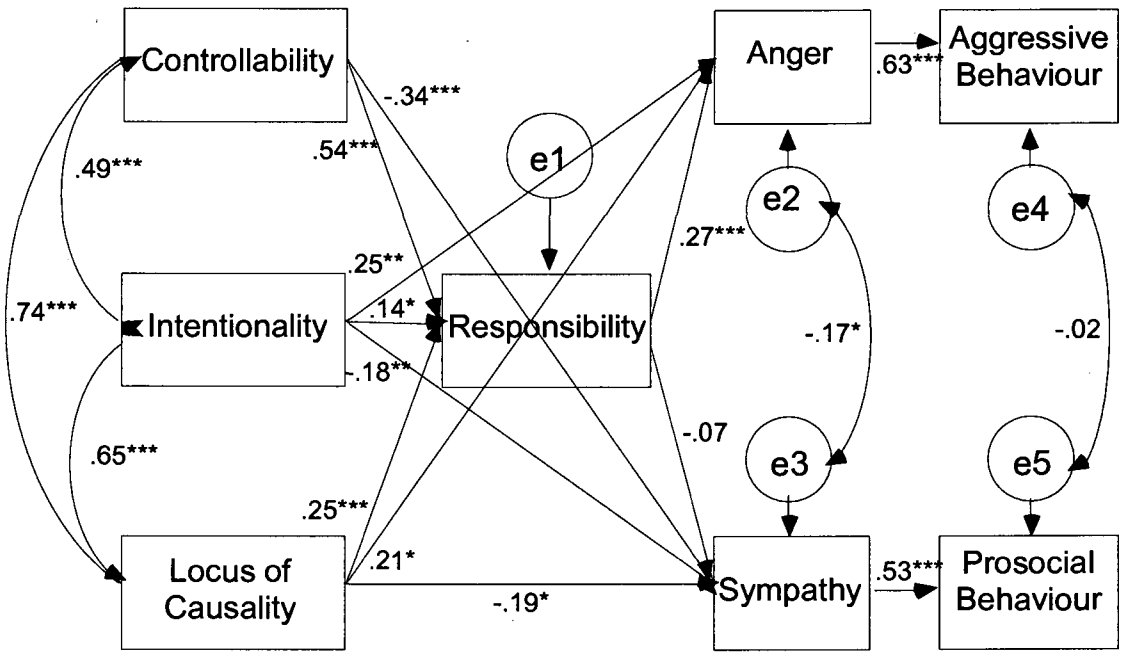


Figure 4

Study 1: Attribution Model



* $p < .05$

** $p < .01$

*** $p < .001$

$n = 214$

Figure 5

Study 2: Content Analysis of Critical Diary Entries (n = 199)

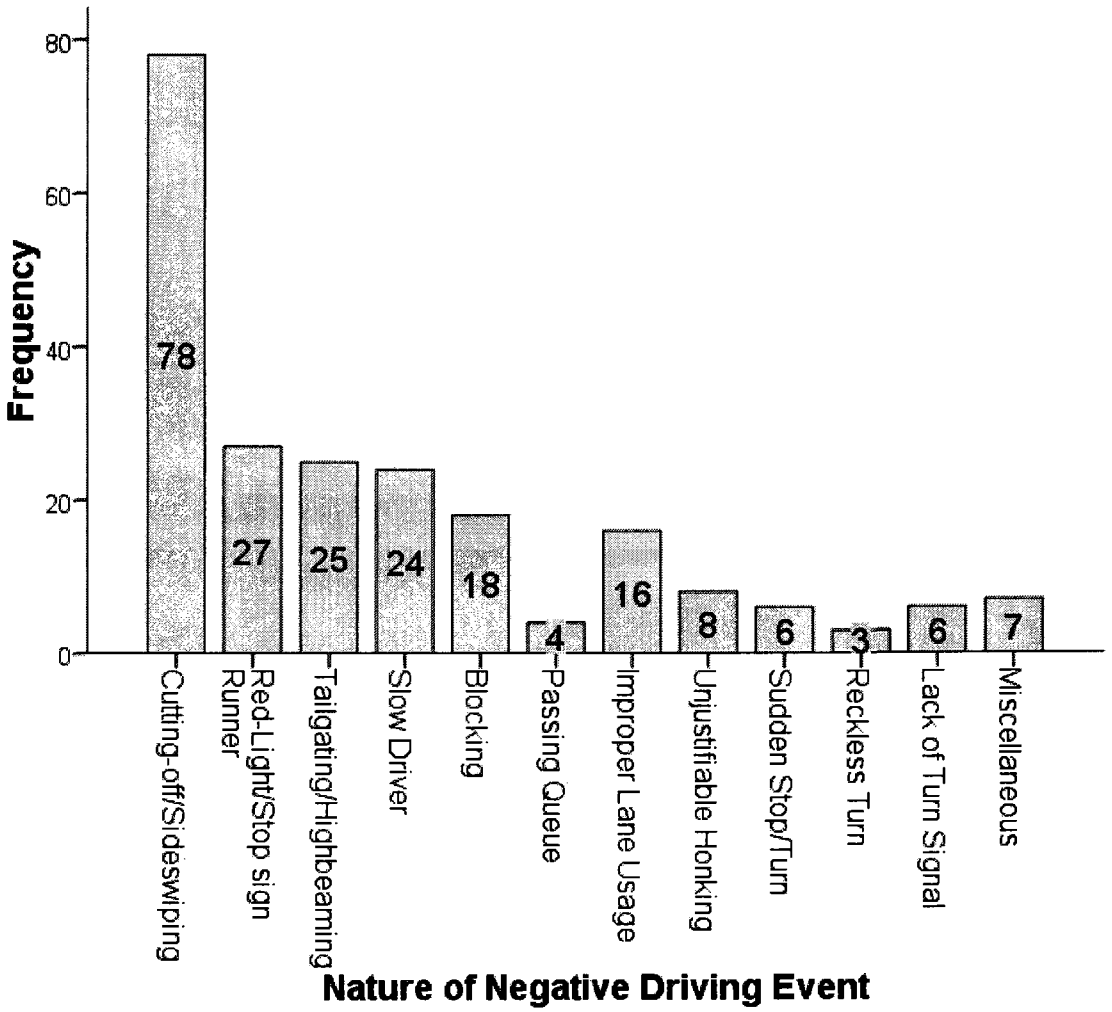
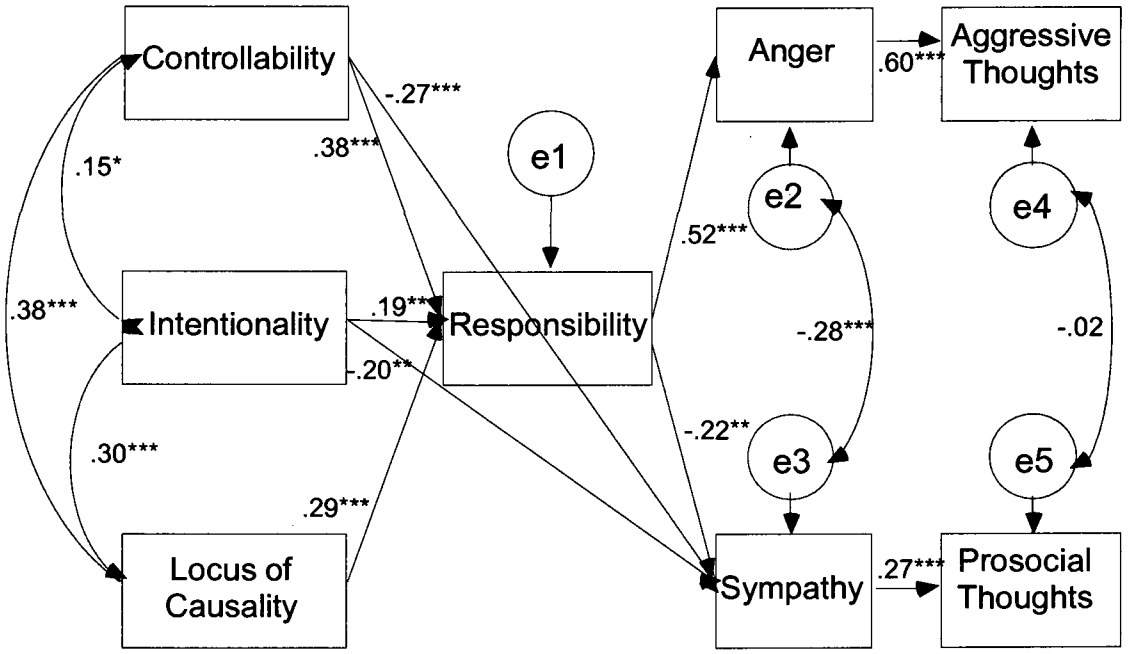


Figure 6

Study 2: "Thoughts" Attribution Model



* $p < .05$

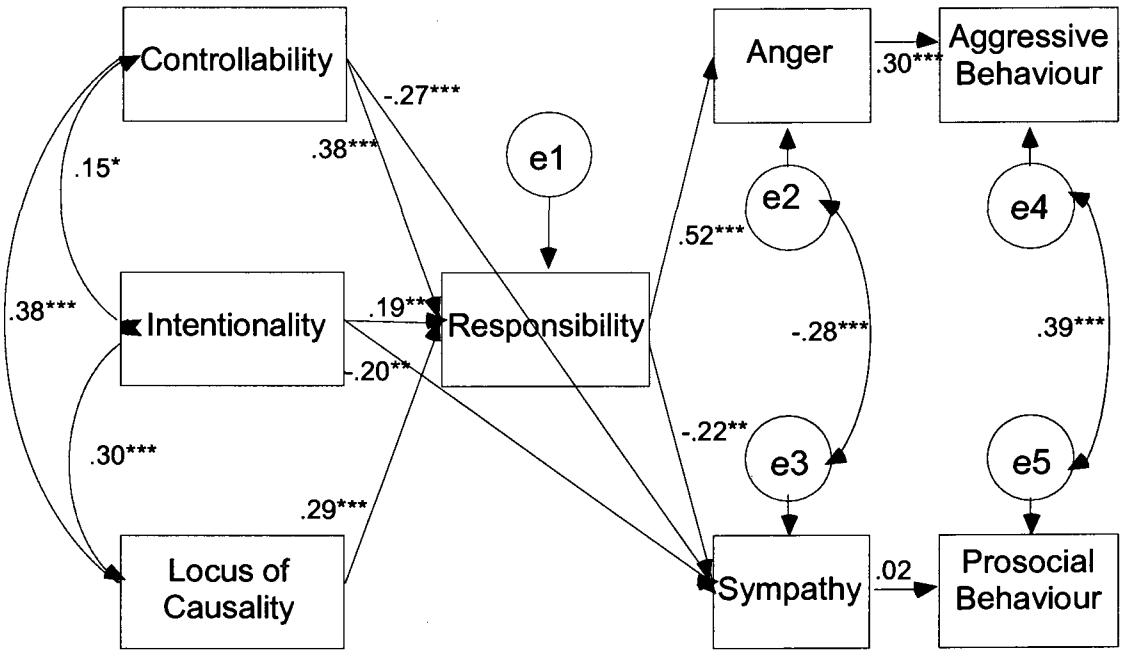
** $p < .01$

*** $p < .001$

$n = 194$

Figure 7

Study 2: "Behaviours" Attribution Model



* $p < .05$

** $p < .01$

*** $p < .001$

$n = 194$

Appendix A

Study 1 Informed Consent Form

Date: November, 2006

Study Name: Attributions in the Driving Environment

Researchers: Christine Wickens & Dr. David L. Wiesenthal

Sponsors: York University

Purpose of the Research: The research is aimed at examining cognitive, emotional, and behavioural responses to events in the roadway environment using a questionnaire format.

What You Will Be Asked to Do in the Research: You will be asked to respond to a questionnaire that focuses on how you would react to various events if they were to occur while you were driving a vehicle. The questionnaire will take approximately 30 minutes to complete.

Risks and Discomforts: We do not foresee any risks or discomfort from your participation in the research.

Benefits of the Research and Benefits to You: Your participation may lead to the development of recommendations to enhance driver education and safety campaigns.

Voluntary Participation: Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the nature of your relationship with York University either now, or in the future.

Withdrawal from the Study: You can stop participating in the study at any time, for any reason, if you so decide. If you choose to stop participating, you will still be eligible to receive the promised participation credit for agreeing to be in the project. Your decision to stop participating, or refusing to answer particular questions, will not affect your relationship with the researchers, York University, or any other group associated with this project. Should you choose to stop participating, all data generated as a consequence of your participation will be destroyed.

Confidentiality: All information you supply during the research will be held in confidence and your name will not appear in any report or publication of the research. Your data will be safely stored in a locked facility and only research staff will have

access to this information. Confidentiality will be provided to the fullest extent possible by law.

Questions About the Research? If you have questions about the research in general or about your role in the study, please feel free to contact Christine Wickens by e-mail (cwickens@yorku.ca) or the research supervisor, Dr. David L. Wiesenthal, either by telephone at (416) 736-2100, extension 30114 or by e-mail (davidw@yorku.ca). This research has been reviewed by the Human Participants in Research Committee, York University's Ethics Review Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, please contact Ms. Alison Collins-Mrakas, Manager, Research Ethics, 309 York Lanes, York University (telephone 416-736-5914 or e-mail acollins@yorku.ca).

Legal Rights and Signatures:

I_____, consent to participate in a research study "Attributions in the Driving Environment" conducted by Christine Wickens and Dr. Wiesenthal. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by signing this form. My signature below indicates my consent.

Signature_____ **Date**_____
Participant

Signature_____ **Date**_____
Principal Investigator

Participant will be given a copy of this document.

Appendix B

Study 1 Driving Scenarios

Controllability – Intentionality

You are driving along a three-lane section of Highway 401. The traffic is moving smoothly. You are travelling in the centre lane at 105 km/h, just above the speed limit. In your rear view mirror, and then your left side view mirror, you notice another vehicle slowly overtaking you in the passing lane. It is a newer model four-door sedan, and it appears to be very clean, shiny, and well-maintained. You continue at a fixed rate of speed in the centre lane. The newer model sedan appears to be travelling at only 110 km/h, so it takes a full 15 seconds for the sedan to finally overtake you in the left lane. The driver of the newer model sedan does not signal to indicate a lane change. But, at the last minute, the driver of the sedan signals once just as the vehicle pulls right in front of you, cutting you off and forcing you to slam on your brakes. Your seat belt retracts tightly across your chest, giving you quite a jolt.

Controllability – No Intentionality

You are driving along a three-lane section of Highway 401. The traffic is moving smoothly. You are travelling in the centre lane at 105 km/h, just above the speed limit. In your rear view mirror, and then your left side view mirror, you notice another vehicle slowly overtaking you in the passing lane. It is a newer model four-door sedan, and it appears to be very clean, shiny, and well-maintained. You continue at a fixed rate of speed in the centre lane. The newer model sedan

appears to be travelling at only 110 km/h, so it takes a full 15 seconds for the sedan to finally overtake you in the left lane. You then notice a sign indicating road construction ahead: the left lane will be ending. There is no left shoulder on this part of the highway, and the driver of the sedan does not signal to indicate that he/she has seen the road construction sign and will be changing lanes. Both you and the other driver then pass over a slight hill/incline in the highway, preventing you from seeing the road ahead of you. Just as you both come over the crest of the hill, the left lane suddenly ends. At the last minute, the driver of the sedan hits the vehicle's brakes a few times quickly but then pulls right in front of you, cutting you off and forcing you to slam on your brakes. Your seat belt retracts tightly across your chest, giving you quite a jolt.

No Controllability – Intentionality

You are driving along a three-lane section of Highway 401. The traffic is moving smoothly. You are travelling in the centre lane at 105 km/h, just above the speed limit. In your rear view mirror, and then your left side view mirror, you notice another vehicle slowly overtaking you in the passing lane. It is a newer model four-door sedan, and it appears to be very clean, shiny, and well-maintained. You continue at a fixed rate of speed in the centre lane. The newer model sedan appears to be travelling at only 110 km/h, so it takes a full 15 seconds for the sedan to finally overtake you in the left lane. Then, the driver of the newer model vehicle signals to indicate a lane change. Just as the driver of the vehicle begins to merge safely into your lane, you both pass over a slight hill/incline. On the other

side of the hill/incline, a large pothole that could not have been seen from a distance is very suddenly evident in the left lane. At the last minute, the driver of the sedan pulls right in front of you, cutting you off and forcing you to slam on your brakes. Your seat belt retracts tightly across your chest, giving you quite a jolt.

No Controllability – No Intentionality

You are driving along a three-lane section of Highway 401. The traffic is moving smoothly. You are travelling in the centre lane at 105 km/h, just above the speed limit. In your rear view mirror, and then your left side view mirror, you notice another vehicle slowly overtaking you in the passing lane. It is a newer model four-door sedan, and it appears to be very clean, shiny, and well-maintained. You continue at a fixed rate of speed in the centre lane. The newer model sedan appears to be travelling at only 110 km/h, so it takes a full 15 seconds for the sedan to finally overtake you in the left lane. All of a sudden, the rear right tire of the sedan blows out and the vehicle pulls right in front of you, cutting you off and forcing you to slam on your brakes. Your seat belt retracts tightly across your chest, giving you quite a jolt.

Appendix C

Study 1 Questionnaire[4]

Part #1

Please read the instructions carefully:

Imagine yourself in the following scenario, as if you are actually experiencing this roadway event.

[INSERT SCENARIO HERE]

Now take a minute to picture the scenario in your mind. When you are done, read the scenario a second time to make sure that you have imagined the details correctly.

After reading the scenario twice and imagining yourself in this scenario, please respond to the following questions. You may wish to review the description of the driving event from time to time in order to refresh your memory. Some of the scales vary from item to item, so please read each question carefully and consider each one separately. Do not be concerned if some of the questions seem very similar. There are no right or wrong answers, so please just answer each item as honestly as you can.

[4] The scale to which each item belongs is listed in brackets, but was not included on the questionnaire received by the participants. As well, as this study was exploratory in nature, not all questionnaire items were considered in the final analysis. For ease of presentation, unused items have been removed.

1. What is the main cause of the other driver cutting you off?: _____

_____

2. Would you say that the main cause of the other driver cutting you off:

Reflected an aspect of the driver						Reflected an aspect of the situation
7	6	5	4	3	2	1

(Locus of Causality)

3. Would you say that the main reason for the other driver cutting you off was:

Not controllable by the driver						Controllable by the driver
1	2	3	4	5	6	7

(Controllability)

4. Would you say that the main reason for the other driver cutting you off was:

Typical of/Common to how the driver always drives					Not typical of/Not common to how the driver always drives
7	6	5	4	3	2	1

(Stability)

5. Do you believe that the other driver intended to cut you off?:

Very much so						Not at all
7	6	5	4	3	2	1

(Intentionality)

6. Do you think the reason for the other driver cutting you off probably influences other areas of the driver's life (not just his/her driving)?:

Very much so						Not at all
7	6	5	4	3	2	1

(Globality)

7. Do you think the driver was to blame for cutting you off?:

Not at all						Very much so
1	2	3	4	5	6	7

(Responsibility)

8. How angry do you feel toward this driver?:

Extremely angry						Not at all angry
7	6	5	4	3	2	1

(Anger)

9. How much sympathy do you have for this driver?:

No sympathy at all						A great deal of sympathy
1	2	3	4	5	6	7

(Sympathy/Concern)

10. How likely is it that you would tailgate/follow closely the other driver in order to teach him/her a lesson?:

Not at all likely						Extremely likely
1	2	3	4	5	6	7

(Aggressive Behaviour – Minor)

11. How likely is it that you would gesture/signal to the other driver that everything is okay?:

Not at all likely						Extremely likely
1	2	3	4	5	6	7

(Prosocial Behaviour)

12. How likely is it that you would swear at and/or verbally abuse the other driver?:

Extremely likely						Not at all likely
7	6	5	4	3	2	1

(Aggressive Behaviour – Minor)

13. How likely is it that you would report the driver to the police in order to get him/her in trouble?:

Not at all likely						Extremely likely
1	2	3	4	5	6	7

(Aggressive Behaviour – Major)

14. If you saw this driver in need of assistance further down the road, how likely is it that you would call to get this driver help (e.g., tow truck, police)?:

Extremely likely						Not at all likely
7	6	5	4	3	2	1

(Prosocial Behaviour)

15. Would you say that something about the situation made the motorist cut you off?:

Very much so						Not at all
1	2	3	4	5	6	7

(Locus of Causality)

16. Do you believe the cause of the event (i.e., the cause of the other driver cutting you off) was beyond the driver's power?:

Very much so						Not at all
1	2	3	4	5	6	7

(Controllability)

17. Do you think the other driver cuts motorists off on a regular basis?:

Not at all						Very much so
1	2	3	4	5	6	7

(Stability)

18. Do you think the other driver deliberately cut you off?:

Not at all						Very much so
1	2	3	4	5	6	7

(Intentionality)

19. Do you think that cutting people off on the highway is probably a clear example of how this driver behaves in other aspects of his/her life?:

Very much so						Not at all
7	6	5	4	3	2	1

(Globality)

20. Would you say that the main reason for the other driver cutting you off was because of:

Something specific to the situation						Something specific to the driver
1	2	3	4	5	6	7

(Locus of Causality)

21. How responsible was the driver for cutting you off?:

Extremely responsible						Not at all responsible
7	6	5	4	3	2	1

(Responsibility)

22. How upset do you feel toward this driver?:

Extremely upset						Not at all upset
7	6	5	4	3	2	1

(Anger)

23. How much compassion do you have for this driver?:

No compassion at all						A great deal of compassion
1	2	3	4	5	6	7

(Sympathy/Concern)

24. How mad do you feel toward this driver?:

Not at all mad						Extremely mad
1	2	3	4	5	6	7

(Anger)

25. How likely is it that you would stop your vehicle and offer assistance to this driver if it were needed further down the road?:

Not at all likely						Extremely likely
1	2	3	4	5	6	7

(Prosocial Behaviour)

26. How likely is it that you would yell at the other driver?:

Not at all likely						Extremely likely
1	2	3	4	5	6	7

(Aggressive Behaviour – Minor)

27. How likely is it that you would gesture (e.g., wave your fist, "give him/her the finger") at the other driver?:

Extremely likely						Not at all likely
7	6	5	4	3	2	1

(Aggressive Behaviour – Minor)

28. Would you say that something about the motorist made him/her cut you off?:

Very much so						Not at all
7	6	5	4	3	2	1

(Locus of Causality)

29. Do you think this driving event (i.e., the other driver cutting you off) was controllable?:

Very much so						Not at all
7	6	5	4	3	2	1

(Controllability)

30. Would you say that cutting off other drivers is probably typical of how this motorist usually drives?:

Very much so						Not at all
7	6	5	4	3	2	1

(Stability)

31. I think the other driver cut me off by accident:

Very much so						Not at all
1	2	3	4	5	6	7

(Intentionality)

32. Do you think the reason for this driver cutting you off probably only affects this driver when he/she is behind the steering wheel of a car?:

Very much so						Not at all
1	2	3	4	5	6	7

(Globality)

33. Do you think the other driver cuts off motorists often?:

Very much so						Not at all
7	6	5	4	3	2	1

(Stability)

34. How accountable do you think the driver was for cutting you off?:

Not at all accountable						Extremely accountable
1	2	3	4	5	6	7

(Responsibility)

35. How much empathy do you have for this driver?:

No empathy at all						A great deal of empathy
1	2	3	4	5	6	7

(Sympathy/Concern)

36. How much does this driver frustrate you?:

Not at all						Very much
1	2	3	4	5	6	7

(Anger)

37. How likely is it that you would get out of your car, prepared to engage physically with the other driver?:

Not at all likely						Extremely likely
1	2	3	4	5	6	7

(Aggressive Behaviour – Major)

38. Would you say that the main cause of the other driver cutting you off was due to an aspect of the situation/ environment?:

Very much so						Not at all
1	2	3	4	5	6	7

(Locus of Causality)

39. Do you think this driving event (i.e., the other driver cutting you off) was preventable?

Not at all						Very much so
1	2	3	4	5	6	7

(Controllability)

40. I think the other driver cut me off on purpose:

Very much so						Not at all
7	6	5	4	3	2	1

(Intentionality)

41. Would you say that the main cause of the other driver cutting you off was due to an aspect of the driver?:

Very much so						Not at all
7	6	5	4	3	2	1

(Locus of Causality)

42. Do you believe that the other driver could have easily avoided cutting you off?:

Very much so						Not at all
7	6	5	4	3	2	1

(Controllability)

43. Do you think the driver should answer for this event (i.e., for cutting you off)?:

Very much so						Not at all
7	6	5	4	3	2	1

(Responsibility)

44. How much does this driver aggravate you?:

Not at all						Very much so
1	2	3	4	5	6	7

(Anger)

45. How likely is it that you would use your horn and/or flash your lights?:

Not at all likely						Extremely likely
1	2	3	4	5	6	7

(Aggressive Behaviour – Minor)

46. How likely is it that you would stop your vehicle and get out, ready to argue?:

Extremely likely						Not at all likely
7	6	5	4	3	2	1

(Aggressive Behaviour – Major)

Part #2

Please check (√) the appropriate box where applicable.

1. Age:_____

2. Sex: □ Male

   □ Female

3. Driving Experience:

   a) Number of **months** with G1 Driver's Licence: _____

   b) Number of **years** with G2 Driver's Licence: _____

   c) Number of **years** with Full G Driver's Licence: + _____

   d) Therefore, in total, how long have you been licensed to drive? _____

4. On average, how many days per week do you drive? _____

Appendix D

Study 2 Informed Consent Form

Date: May, 2007

Study Name: Negative Events in the Driving Environment

Researchers: Christine Wickens & Dr. David L. Wiesenthal

Sponsors: York University

Purpose of the Research: The research is aimed at examining cognitive, emotional, and behavioural responses to events in the roadway environment using a questionnaire format.

What You Will Be Asked to Do in the Research: You will be asked to submit four on-line driving diary entries over the course of eight days. This will involve answering a few short questions about the most negative driving event (involving another motorist) that you have experienced in the past 48 hours. At the end of the eight days, you will respond to a series of questions regarding your most negative driving event of the eight-day period, as well as questions regarding various attitudes, personality characteristics, and individual differences. Across the eight days, the full study should take approximately one hour to complete.

Risks and Discomforts: We do not foresee any risks or discomfort from your participation in the research.

Benefits of the Research and Benefits to You: You will receive URPP credit (or appropriate pre-determined compensation). Your participation may lead to the development of recommendations to enhance driver education and safety campaigns.

Voluntary Participation: Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the nature of your relationship with York University either now, or in the future.

Withdrawal from the Study: You can stop participating in the study at any time, for any reason, if you so decide. If you choose to stop participating, you will still be eligible to receive the promised participation credit/compensation for agreeing to be in the project. Your decision to stop participating, or refusing to answer particular questions, will not affect your relationship with the researchers, York University, or any other group associated with this project. Should you choose to stop participating, all data generated as a consequence of your participation will be destroyed.

Confidentiality: All information you supply during the research will be held in confidence and your name will not appear in any report or publication of the research. Your data will be safely stored in a locked facility and only research staff will have access to this information. Confidentiality will be provided to the fullest extent possible by law.

Questions About the Research? If you have questions about the research in general or about your role in the study, please feel free to contact Christine Wickens by e-mail (cwickens@yorku.ca) or the research supervisor, Dr. David L. Wiesenthal, either by telephone at (416) 736-2100, extension 30114 or by e-mail (davidw@yorku.ca). This research has been reviewed by the Human Participants in Research Committee, York University's Ethics Review Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, please contact Ms. Alison Collins-Mrakas, Manager, Research Ethics, 309 York Lanes, York University (telephone 416-736-5914 or e-mail acollins@yorku.ca).

Legal Rights: I am not waiving any of my legal rights by indicating my consent below.

NOTE: A copy of this consent form will be e-mailed to you for your records.

Please provide your York University e-mail address (or the address that you check most frequently).

_____

Do you consent to participate in this research study?
□ Yes
□ No

Appendix E

Study 2 Diary Entry

Take a minute to think about the negative driving events involving other motorists that you have experienced in the last two days (i.e., in the last 48 hours). These events may not have been very serious compared to other days, but drivers usually report at least minor annoyances from other drivers. In your mind, picture the most negative driving event of the last 48 hours that involved another motorist. With your negative driving event in mind, please respond to the following questions.

(NOTE: If you did not drive your vehicle in the last 48 hours, or you did not drive a far enough distance to experience even a minor annoyance on the roadway, please enter "N/A" for questions #1 to #4, and choose "1" for questions #5, #6, and #7.)

1. Describe the nature of the event.

(For example, did someone cut you off or tailgate you? Drive behind you at night with their high beams on? Drive toward you at night with their high beams on? Speed up when you tried to pass them? Shout at you about your driving? Make a rude gesture toward you? Honk at you? Drive too slowly? Not start moving as soon as the light turned green? Not move out of the passing lane? Drive well above the speed limit? Drive too fast for the road conditions? Run a stop sign or red light? Other?)

2. Where did the encounter take place?

3. How did the encounter make you feel?

4. What did you do after the encounter?

(For example, did you try to escape from the situation? Beep your horn and/or flash your lights? Give the other driver a dirty look or stare? Gesture at the other driver? Swear at and/or verbally abuse the other driver? Drive close to/follow the other driver in order to teach him/her a lesson? Stop your vehicle and get out, ready to argue? Get out of your car, prepared to engage physically with the other driver? Other?

5. How negative was this driving event?

7	6	5	4	3	2	1
Very negative						Not at all negative

6. Would you say that this driving event was a severe one?

1	2	3	4	5	6	7
Not at all						Very much so

7. How angry did you feel toward this driver?

1	2	3	4	5	6	7
Not at all angry						Extremely angry

Appendix F

Study 2 Post-Diary Questionnaire[5]

Part 1 – Questions About Your Most Negative Event in the Past Eight Days

Remember to **read the instructions for all parts of the following survey.**

Please do NOT use the 'forward' and 'backward' buttons on your web browser. Instead **use the 'NEXT' button provided at the bottom of each page of the survey.**

Be careful when proceeding through the survey, as you will only be able to view each page once. **After you have moved on to the next page in the survey, you will not be able to move backward to change your answers on a previous page.**

Part A:

1. In my final email to you, I identified the driving event from your eight-day diary that you rated as the most negative/upsetting. Please write a short paragraph describing this driving event (what happened, how did you feel, what did you do). If you do not feel that this was the most negative/upsetting driving event involving another motorist that you experienced in the previous eight days, please write a short paragraph describing what was your most negative/upsetting driving event involving another motorist.

---

[5] The scale to which each item belongs is listed in brackets, but was not included on the questionnaire received by the participants. As well, as this study was exploratory in nature, not all questionnaire items were considered in the final analysis. For ease of presentation, unused items have been removed.

_____

_____

_____

_____

2. What was the main cause of the driving event that you identified as the most negative/upsetting in the past eight days? Why did it occur?

_____

_____

_____

Part B:

With your most negative/upsetting driving event in mind, please respond to the following questions. Some of the scales vary from item to item, so please read each question carefully and consider each one separately. Do not be concerned if some of the questions seem very similar. There are no right or wrong answers, so please answer each item as honestly as you can.

1. Would you say that the main cause of this negative driving event:

7	6	5	4	3	2	1
Reflected an aspect of the other driver						Reflected an aspect of the situation

(Locus of Causality)

2. Would you say that the main reason for this negative driving event was:

1	2	3	4	5	6	7
Not controllable by the other driver						Controllable by the other driver

(Controllability)

4. Do you believe that the other motorist *intended* to drive this way?:

7	6	5	4	3	2	1
Very much so						Not at all

(Intentionality)

6. Do you think the other driver was to blame for this negative driving event?:

1	2	3	4	5	6	7
Not at all						Very much so

(Responsibility)

7. How angry did you feel toward this driver?:

7	6	5	4	3	2	1
Extremely angry						Not at all angry

(Anger)

8. How much sympathy did you have for this driver?:

1	2	3	4	5	6	7
No sympathy at all						A great deal of sympathy

(Sympathy/Concern)

9. To what extent did you THINK ABOUT tailgating/following closely the other driver in order to teach him/her a lesson?:

1	2	3	4	5	6	7
Not at all						Very much so

(Aggressive Thought)

10. To what extent DID you tailgate/follow closely the other driver in order to teach him/her a lesson?:

1	2	3	4	5	6	7
Not at all						Very much so

(Aggressive Behaviour)

11. To what extent did you THINK ABOUT gesturing/signalling to the other driver that everything was okay?:

1	2	3	4	5	6	7
Not at all						Very much so

(Prosocial Thought)

12. To what extent DID you gesture/signal to the other driver that everything was okay?:

1	2	3	4	5	6	7
Not at all						Very much so

(Prosocial Behaviour)

13. To what extent did you THINK ABOUT swearing at and/or verbally abusing the other driver?

7	6	5	4	3	2	1
Very much so						Not at all

(Aggressive Thought)

14. To what extent DID you swear at and/or verbally abuse the other driver?:

7	6	5	4	3	2	1
Very much so						Not at all

(Aggressive Behaviour)

17. If you had seen this driver in need of assistance further down the road, how likely is it that you would have called to get this driver help (e.g., tow truck, police)?:

7	6	5	4	3	2	1
Extremely likely						Not at all likely

(Prosocial Thought)

18. Would you say that something about the situation made the other motorist drive this way?

1	2	3	4	5	6	7
Very much so						Not at all

(Locus of Causality)

19. Do you believe the cause of this negative driving event was beyond the other driver's power?:

1	2	3	4	5	6	7
Very much so						Not at all

(Controllability)

21. Do you think the other motorist deliberately drove this way?:

1	2	3	4	5	6	7
Not at all						Very much so

(Intentionality)

23. Would you say that the main reason for the other motorist driving this way was because of:

1	2	3	4	5	6	7
Something specific to the situation						Something specific to the other motorist

(Locus of Causality)

24. How responsible was the other driver this negative driving event?:

7	6	5	4	3	2	1
Extremely responsible						Not at all Responsible

(Responsibility)

25. How upset did you feel toward this driver?:

7	6	5	4	3	2	1
Extremely upset						Not at all upset

(Anger)

26. How much compassion did you have for this driver?:

1	2	3	4	5	6	7
No compassion at all						A great deal of compassion

(Sympathy/Concern)

27. How mad did you feel toward this driver?:

1	2	3	4	5	6	7
Not at all mad						Extremely mad

(Anger)

30. How likely is it that you would have stopped your vehicle and offered assistance to this driver if it had been needed further down the road?:

1	2	3	4	5	6	7
Not at all likely						Extremely likely

(Prosocial Thought)

31. To what extent did you THINK ABOUT yelling at the other driver?:

1	2	3	4	5	6	7
Not at all						Very much so

(Aggressive Thought)

32. To what extent DID you yell at the other driver?:

1	2	3	4	5	6	7
Not at all						Very much so

(Aggressive Behaviour)

34. To what extent did you <u>THINK ABOUT</u> gesturing (e.g., waving your fist, "giving him/her the finger") at the other driver?:

7	6	5	4	3	2	1
Very much so						Not at all

(Aggressive Thought)

35. To what extent DID you gesture (e.g., wave your fist, "give him/her the finger") at the other driver?:

7	6	5	4	3	2	1
Very much so						Not at all

(Aggressive Behaviour)

37. Would you say that something about the other motorist made him/her drive this way?:

7	6	5	4	3	2	1
Very much so						Not at all

(Locus of Causality)

38. Do you think the other driver's behaviour was controllable?:

7	6	5	4	3	2	1
Very much so						Not at all

(Controllability)

40. I think the other motorist was driving this way by accident:

1	2	3	4	5	6	7
Very much so						Not at all

(Intentionality)

43. How accountable do you think the other driver was for this negative driving event?:

1	2	3	4	5	6	7
Not at all accountable						Extremely accountable

(Responsibility)

44. How much empathy did you have for this driver?:

1	2	3	4	5	6	7
No empathy at all						A great deal of empathy

(Sympathy/Concern)

45. How much did this driver frustrate you?:

1	2	3	4	5	6	7
Not at all						Very much so

(Anger)

50. Would you say that the main cause of this negative driving event was due to an aspect of the situation/environment?:

1	2	3	4	5	6	7
Very much so						Not at all

(Locus of Causality)

51. Do you think the other driver's behaviour was preventable?

1	2	3	4	5	6	7
Not at all						Very much so

(Controllability)

52. I think the other driver behaved this way on purpose:

7	6	5	4	3	2	1
Very much so						Not at all

(Intentionality)

53. Would you say that the main cause of the other driver behaving this way was due to an aspect of the driver?:

7	6	5	4	3	2	1
Very much so						Not at all

(Locus of Causality)

54. Do you believe that the other driver could have easily avoided this negative driving event?:

7	6	5	4	3	2	1
Very much so						Not at all

(Controllability)

55. Do you think the other driver should answer for his/her behaviour?:

7	6	5	4	3	2	1
Very much so						Not at all

(Responsibility)

57. How much did this driver aggravate you?:

1	2	3	4	5	6	7
Not at all						Very much so

(Anger)

58. To what extent did you <u>THINK ABOUT</u> using your horn and/or flashing your lights?:

1	2	3	4	5	6	7
Not at all						Very much so

(Aggressive Thought)

59. To what extent DID you use your horn and/or flash your lights?:

1	2	3	4	5	6	7
Not at all						Very much so

(Aggressive Behaviour)

Part 2 – Demographic Information:

1. Age:_____

2. Sex: □ Male

□ Female

3. Driving Experience:

a) Number of **MONTHS** with G1 Driver's Licence: _____

b) Number of **YEARS** with G2 Driver's Licence: _____

c) Number of **YEARS** with Full G Driver's Licence: + _____

d) Therefore, in total, how many **YEARS** have you been licensed to drive? (Please use a decimal place if needed) _____

NOTE: Your answers for a, b, and c should add up to equal your answer for d. In other words, a + b + c = d.