Personal versus situational factors in the elicitation of anger

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Abstract

In this study, the elicitation of anger was examined in hypothetical traffic scenarios. It was hypothesised that the occurrence and strength of anger varies as a function of three factors: goal congruence, personal interaction and task demands. Also, the relationship between anger on the one hand and reactions to the same events on the other hand was examined. Respondents (n = 224) were presented with 8 traffic scenarios which were either goal congruent or goal incongruent, involved either personal interaction with other road users or not, and in which task demands were either high or low. After each scenario, respondents were asked to rate how angry they would be in this situation, and what would be their most likely reaction to the traffic situation. Also, questions regarding trait anger and trait anxiety were asked. Results showed that reported anger was strongest in situations which were goal incongruent and involved interaction with other road users. Goal congruent events led mostly to positive reactions if the event was not personal. Goal incongruent events led mostly to negative reactions (negative facial behaviour and negative gesture) if the event was personal. Goal incongruent events also led to a positive reaction: this was the case only when the event was not personal. The reaction reported most in this situation is driving with increased concentration. These results show that interpersonal factors are more important for the occurrence of anger in traffic than situational factors. Therefore, measures that decrease traffic density to prevent aggression, for example, may not be as successful as expected and measures directed at the way people interpret other people's behaviour may deserve more attention.

1. Introduction

It is increasingly acknowledged that anger influences traffic safety. In most studies on anger in traffic, a connection is made between anger and traffic safety through driver aggression: anger

on the road may lead to driver aggression, and affects accident risk through violence or aggressive violations (see for example Hennessy & Wiesenthal, 1999; Lajunen et al, 1998; Lajunen & Parker, 2001; Levelt, 1997; Shinar, 1998). Other studies assumed a more direct link between anger on the one hand and driving behaviour on the other (Arnett et al., 1997; Underwood et al., 1999). However, as yet the empirical evidence that anger in fact decreases traffic safety is rather weak: most connections that have been shown are indirect, and the direction of causality often remains open because of the correlational design of most studies. When more empirical evidence is available for the effects of anger on traffic safety and the processes through which anger is elicited, traffic safety measures may be developed.

What is it that makes drivers angry behind the wheel? Several authors used the frustration-aggression hypothesis (Dollard, 1939) and proposed that it is frustration, the blocking of goals that is the primary cause of anger while driving (Lajunen & Parker, 2001; Shinar, 1998). Others compared traffic with non-traffic situations to see whether there are certain characteristics in traffic that make drivers prone to experiencing anger (Lawton & Nutter, 2002; Parkinson, 2001).

Although a large amount of the fundamental research in the field of emotion has been directed at the development of emotion theories, these theories have hardly been used in more applied research settings like traffic psychology. Appraisal theory is one of the most influential theories in the field of emotion, yet only Parkinson (2001) and Levelt (2001, 2003) used this framework in the context of traffic research. According to appraisal theory, it is not the situation that makes us angry, but our *appraisal* of the situation. The frustration-aggression hypothesis does not assume such a cognitive evaluation of the event. When an event takes place, we ask ourselves several consecutive questions. First: is this event relevant to the goal I am pursuing? If so: is this event in line with my goals (goal congruent) or not (goal incongruent)? These questions determine whether the emotion experienced is positive or negative. A third question, to determine the type of emotion, is: is someone accountable or to blame for the event? If the answer to this question is yes, then anger should be the result. There are other questions, or appraisal components, that are relevant to anger (e.g. the role of ego-involvement) but these three are the most important components, according to Lazarus (1990).

The frustration-aggression hypothesis and appraisal theory make partly different predictions on how different traffic situations affect the experience of anger in traffic, at least in the case of goal incongruent events. According to the frustration-aggression hypothesis, anger will occur when any goal is blocked, regardless of accountability. Appraisal theory states that goal-

blocking is not enough to elicit anger: someone should be accountable for the event. To examine the importance of accountability in the elicitation of anger in traffic, in the current study two appraisal components are varied: goal congruence (either the event is congruent or incongruent with the person's goals) and personal interaction (another person is accountable for the event or not).

For emotions to be elicited, a certain threshold has to be reached: not every event causes anger, even though it may be goal relevant and goal incongruent, and someone may be to blame (Frijda, 1986). Therefore, a third aspect, task demand, was varied because it might lower the threshold for anger to occur. According to Hennessy and Wiesenthal (1999), congestion is a traffic situation that can be seen as implying a high level of task demand. The authors also conclude that personal concerns, such as being under time pressure may add to frustration, irritation and negative affect which are associated with the situational demands. Maule et al. (2000) also found an effect of time pressure on the affective state during task performance.

In other words: a combination of time pressure and high congestion constitutes a highly demanding traffic situation that is associated with emotional reactions such as frustration, irritation and negative affect. In the current study it is assumed that under conditions of high task demand (a combination of time pressure and high congestion) the threshold for emotions to occur is lower. Therefore, an event that takes places under conditions of high task demand will lead to more or stronger angry reactions than an event that takes place under conditions of low task demand. Furthermore, it is expected that the effects of the other two variables on emotion (goal congruence and personal interaction) will be stronger in the high task demand conditions than in the low task demand conditions.

Hypotheses

In summary, the effects of goal congruence, personal interaction and task demands on the elicitation of anger were investigated in this study. It is expected that goal incongruent traffic events lead to higher levels of anger than goal congruent events. Furthermore it is expected that the level of anger is higher when the event involves other road users than when the event is situational. Finally, it is expected that these effects are strongest under conditions of high task demand.

2. Method

Procedure The data reported here were part of a larger study on the occurrence of emotions while driving. An envelope containing an introduction letter, a questionnaire booklet and a freepost return envelope, was sent to a random sample of 1500 Dutch telephone subscribers. In the introduction letter the study was presented as "a study on the evaluation of different traffic situations", directed at driving license holders. After 4 weeks and one reminder, 274 questionnaires were returned: a response rate of 18 percent. A possible explanation for this rather low response rate is that not all persons contacted were holders of a driving license. Furthermore, no incentive was offered for returning the questionnaire; a factor which is known to enhance the response rate. Finally, no extra copy of the questionnaire was included in the reminder envelope. It is possible that respondents had already thrown away the earlier copy of the questionnaire when they received the reminder.

Respondents Possibly because of the low response rate the sample was slightly biased regarding gender and driving experience. In our sample, 62,1% was male (whereas in the entire population of driving license holders 55% is male (CBS/OVG, 1999)). The annual kilometrage driven by the respondents was 25.000, compared to 16.300 in the population (CBS/OVG, 1999). The average age of the respondents was 47,4 years (sd = 15,5, range = 20-90). The average time that respondents had held a driving license was 25,7 years (sd = 14,2, range = 0-67).

Scenarios Each participant was presented with the same 8 scenarios. Each scenario described a hypothetical event during car driving. The events differed on three aspects: task demands (low task demands vs high task demands), goal congruence (task goals are blocked vs task goals are promoted) and type of event (personal vs situational; see Table 1). The full text of the scenarios is presented in Appendix 1.

Table 1: Design

		Goal congruent event	**Goal incongruent event**
High task demands	**Personal event**	*Scenario 7*	*Scenario 3*
	Situational event	*Scenario 2*	*Scenario 4*
Low task demands	**Personal event**	*Scenario 5*	*Scenario 1*
	Situational event	*Scenario 8*	*Scenario 6*

Experienced anger and reactions to anger The questions following each scenario were directed at experienced anger and anger reactions. Ratings of experienced anger were obtained by presenting respondents with three anger items: angry, annoyed, frustrated. Respondents could rate these items on a 5-point scale ranging from 1 (not at all) to 5 (very). A list of possible reactions to the scenarios was constructed. Possible reactions were ranked in such a way that the reactions varied from negative driving-related behaviour, negative expression, to neutral (no reaction), positive expression and positive driving-related behaviour. This resulted in the following list of reactions:

-3 = Drive differently in a negative sense (for example less safe, loss of concentration)
-2 = Make a negative gesture
-1 = Show a negative facial expression
0 = Do nothing
1 = Show a positive facial expression
2 = Make a positive gesture
3 = Drive differently in a positive sense (for example more safe, increased concentration)

Trait Anger and Trait Anxiety The anger which people experience and express in certain situations differs from person to person. Some people tend to react angry to whatever happens while other people show a more anxious reaction. To account for these individual differences, two personality scales were included in the questionnaire: the Trait Anger Scale (Spielberger et al., 1983) and the Trait Anxiety Scale (Spielberger et al., 1970). "Trait anger" is defined as the frequency in which people get angry: people high in trait anger are supposed to interpret a wide range of situations as anger-provoking. Trait anxiety is defined as the degree to which a person responds to situations with apprehension and uneasiness. The Trait Anger and Trait Anxiety Scales were translated into Dutch by the author of the present study.

3. Results

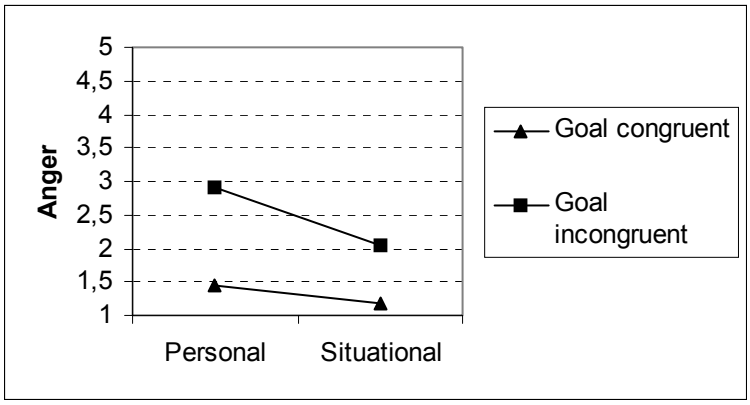
First, in order to check whether the three emotions which were used (angry, annoyed, frustrated) rated about the same, Cronbach's Alpha was calculated for each of the eight scenarios. The values of alpha varied from .74 to .88 and this was concluded to be sufficiently high to construct a new anger variable. Then, the means and standard deviations of this new variable were calculated for each of the 8 scenarios (see Table 2). In general, the means were rather low, suggesting that the scenarios did not provoke a high level of anger.

Table 2: Means and standard deviations of experienced anger per scenario (scale 1-5).

	High demand, goal congruent, personal *(Scenario 7)*	High demand, goal congruent, situational *(Scenario 2)*	High demand, goal incongruent, personal *(Scenario 3)*	High demand, goal incongruent, situational *(Scenario 4)*	Low demand, goal congruent, personal *(Scenario 5)*	Low demand, goal congruent, situational *(Scenario 8)*	Low demand, goal incongruent, personal *(Scenario 1)*	Low demand, goal incongruent, situational *(Scenario 6)*
Mean	1,56	1,19	3,02	2,2	1,38	1,19	2,77	1,89
SD	0,78	0,4	0,98	0,99	0,6	0,44	0,86	0,84

The anger scores were analysed by a repeated measures MANOVA, with the three factors (goal congruence, personal interaction and task demands) as independent variables. To control for individual differences, the scores were corrected for trait anger and trait anxiety by including the scores on these variables as covariates. No main effects of the three independent variables were found. However an interaction effect was shown between goal congruence and personal interaction: reported anger was higher after a personal event than after a situational event, but only when the event was goal-incongruent ($F(1, 217) = 10{,}76$, $p < .01$; see Figure 1).

Figure 1: Self-reported anger as a function of goal congruence and personal interaction



Reaction to the scenarios As a fourth step in the analyses, the distribution of answers to the question "what would be your most likely reaction?" was calculated (see Table 3). No comparison of means was done because the distribution of the scores on this variable justified only analyses for ordinal data. The following findings emerge from this table.

Negative reactions were most frequently reported after events that are goal incongruent and personal. In low task demand conditions, almost half of the respondents reported that they would show a negative facial expression, and 11,2% reported they would make a negative gesture. In conditions of high task demand, over 20% reported that they would make a negative gesture. A positive gesture was not reported often. A positive facial expression was reported more frequently after (goal congruent) situational scenarios than after (goal congruent) personal scenarios. The table also shows that the percentage of respondents that did not react at all, was highest in the scenarios 5 (59,8%) and 7 (59,6%), which involved a goal congruent and personal event. The percentage of respondents that did not react was also quite high in scenarios 2 (31,8%) and 8 (45,8%) which also involved goal congruent events, but these were situational. So, the inclination to react was strongest when the event was goal incongruent.

Furthermore, it can be seen that in some cases a goal incongruent event led to a positive reaction: this was the case when the event was situational: a quite high percentage of the respondents (63,2% when demand is high; 63,1% when demand is low) indicated that they would drive differently in a positive way, for example with increased concentration or more secure.

Table 3: Distribution of answer categories in percentages for reactions to 8 traffic scenarios

	High demand, goal congruent, personal (Sc 7)	High demand, goal congruent, situational (Sc2)	High demand, goal incongruent personal (Sc3)	High demand, goal incongruent situational (Sc4)	Low demand, goal congruent, personal (Sc5)	Low demand, goal congruent, situational (Sc8)	Low demand, goal incongruent personal (Sc1)	Low demand, goal incongruent situational (Sc6)
Drive differently, negative (-3)	0,4%	3,4%	1,9%	6,4%	0%	5,3%	1,1%	2,7%
Negative gesture (-2)	1,5%	0,4%	20,6%	0,4%	1,1%	0,4%	11,2%	0,8%
Negative expression (-1)	6,9%	0%	40,5%	12,8%	3,8%	0,4%	49,3%	6,8%
Nothing (0)	59,6%	31,8%	19,5%	15,4%	59,8%	45,8%	23,9%	26,2%
Positive expression (1)	17,3%	32,2%	1,1%	1,9%	22,7%	30,2%	2,2%	0,4%
Positive gesture (2)	6,2%	2,2%	3,8%	0%	7,6%	1,1%	3,7%	0%
Drive differently, positive (3)	8,1%	30,0%	12,6%	63,2%	4,9%	16,8%	8,6%	63,1%
Total	100%	100%	100%	100%	100%	100%	100%	100%

In sum, goal congruent events mostly led to positive reactions (in this case positive facial expressions) when the event was situational. Goal incongruent events mostly led to negative reactions (negative facial behaviour and negative gesture) if the event was personal. Goal incongruent events also led to a positive reaction: this was the case only when the event is

situational. The reaction which was most often reported in this situation was driving with increased concentration.

Relation anger - reaction

For each of the eight scenarios, correlations were calculated between the level of reported anger and the most likely reaction. Non-parametric correlations were chosen because for one of the variables (reaction) only an ordinal scale was used.

Table 4: Spearman's Correlations between reported anger and most likely reaction for each scenario

	Spearman's Rho
High demand, goal congruent, personal (scenario 7)	-0.20**
High demand, goal congruent, situational (scenario 2)	0.02
High demand, goal incongruent, personal (scenario 3)	-0.42**
High demand, goal incongruent, situational (scenario 4)	-0,19**
Low demand, goal congruent, personal (scenario 5)	-0.09
Low demand, goal congruent, situational (scenario 8)	-0.04
Low demand, goal incongruent, personal (scenario 1)	-0.34**
Low demand, goal incongruent, situational (scenario 6)	-0.06

All significant correlations were negative, meaning that high levels of reported anger correspond with negative reactions. Goal incongruent events that involved personal interaction (scenarios 1 and 3) showed highest correlations between anger and reaction. Also scenario 4, which was goal incongruent and situational, in conditions of high task demands, showed a significant correlation between anger and reaction. It would have been expected that the fourth goal incongruent scenario (scenario 6, situational, low task demand) would also show a significant correlation between anger and reaction. Instead it was scenario 7 for which anger and reaction correlated. So even though the average anger level was higher for scenario 6 than for scenario 7(see Table 2), the link with a corresponding reaction was stronger for scenario 7 than for scenario 6.

Discussion

It was hypothesised that goal-incongruent events would lead to higher levels of anger than goal congruent events. However, only in combination with personal interaction there was an effect of goal incongruence: when the event presented was goal incongruent, respondents reported more

anger when the event involved some kind of interpersonal component than when the event was purely situational. These results are in accordance with what Parkinson (2001) found: another person was usually involved when anger occurred; whether the event was related to traffic or not. Parkinson also stated that personal interaction should not be seen as a single cause for anger, which was reflected in the results of this study as well: also in situational events a certain level of anger was reported but the level was much lower than when the event was personal. From these results it can be concluded that interpersonal events are more prone to elicit anger than situational events, and the results therefore seem to be more in line with appraisal theory than with the frustration-aggression hypothesis.

The reactions which were reported by respondents, corresponded roughly with the level of reported anger. Goal incongruent events most often led to negative reactions when the event was personal, and reactions seem to reflect anger as well: goal incongruent personal events were associated with more anger *and* with more negative reactions than goal incongruent situational events. Furthermore, goal incongruent situational events were often associated with subjects reporting driving with increased concentration (a positive reaction). It is interesting to see that this increased concentration did not occur often after a *personal* goal incongruent event. It should be noted that the respondents could give only one answer to the question: what would be your most likely reaction? So, the most likely reaction of most respondents was displaying a negative gesture or facial expression. Three of the goal incongruent scenarios and one of the goal congruent scenarios showed negative correlations between anger and reaction. Generally, a higher level of anger corresponded with a stronger negative reaction.

These results suggest that it is the combination of blocked goals and the attribution of blame, more than the blocking of goals in itself, that is most likely to cause anger. This is more in line with appraisal theory than with frustration-aggression hypothesis. A popular notion nowadays is that driver aggression is partly caused by increasing traffic density. However, the results of this study imply that measures to prevent anger and aggression by decreasing traffic density, for example by increasing the capacity of roads, may not be as successful as expected and measures directed at the way people interpret other people's behaviour might deserve more attention. The fact that task demands did not influence the results much, supports this. However, more research is needed, for example on the role of other emotions, and the role of other appraisal components in the elicitation of emotions.

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Appendix 1: Text of the scenarios

Scenario 1: Low task demand, goal incongruent, personal

You are driving on a **quiet** highway in the middle of the day. There is not much traffic. You **do not have important meetings**: you do not have to be at your destination at a specific time. You are driving in the right-hand lane and to your right is an acceleration lane. A car is driving on the acceleration lane at a high speed. When the car is almost next to you, the driver indicates direction and starts merging. You have to hit the brakes to prevent a collision.

Scenario 2: High task demand, goal congruent, situational

You are driving on a **busy** ring road around a big city in the **rush hour**. **You have a meeting**, so it is important that you arrive at your destination in time. It is raining heavily. Furthermore, the road is in bad condition: water is splashing up, there are large puddles of water on the road and you can hardly see a thing. The windscreen wipers are working at full speed. Then you arrive at a road section which has recently been renovated. They have used ZOAB here: the kind of asphalt that absorbs water, so there does not seem to be any water on the road. Now, the viewing conditions are a lot better.

Scenario 3: High task demand, goal incongruent, personal

You are driving on a **busy** ring road around a big city in the **rush hour**. **You have a meeting**, so it is important that you arrive at your destination in time. You are driving in the right-hand lane and to your right is an acceleration lane. A car is driving in the acceleration lane at a high speed. When the car is almost next to you, the driver indicates direction and starts merging. You have to hit the brakes to prevent a collision.

Scenario 4: High task demand, goal incongruent, situational

You are driving on a **busy** ring road around a big city in the **rush hour**. **You have a meeting**, so it is important that you arrive at your destination in time. It is raining heavily. Fortumately, they have used ZOAB here: the kind of asphalt that absorbs water, so there does not seem to be any water on the road. Therefore the viewing conditions are good, even though it is raining. Then you arrive at a road section which is in bad condition: water is splashing up, there are large puddles of water on the road and you can hardly see a thing. The windscreen wipers are working at full speed.

Scenario 5: Low task demand, goal congruent, personal

You are driving on a **quiet** highway in the middle of the day. There is not much traffic. You **do not have important meetings**: you do not have to be at your destination at a specific time. You are driving in the right-hand lane and to your right is an acceleration lane. A car is driving in the acceleration lane at a high speed. When the car is almost next to you, the driver indicates direction to make clear that he is planning to merge. Fortunatelly he brakes and merges behind you, so you can maintain your own speed.

Scenario 6: Low task demand, goal incongruent, situational

You are driving on a **quiet** highway in the middle of the day. There is not much traffic. You **do not have important meetings**: you do not have to be at your destination at a specific time. It is raining heavily. Luckily, they have used ZOAB here: the kind of asphalt that absorbs water, so there does not seem to be any water on the road. Therefore the viewing conditions are good,

even though it is raining. Then you arrive at a road section which is in bad condition: water is splashing up, there are large spots of water on the road and you can hardly see a thing. The windscreen wipers are working at full speed.

Scenario 7: High task demand, goal congruent, personal

You are driving on a **busy** ring road around a big city in the **rush hour**. **You have a meeting** so it is important that you arrive at your destination in time. You are driving in the right lane and to your right is an acceleration lane. A car is driving in the acceleration lane at a high speed. When the car is almost next to you, the driver indicates direction to make clear that he is planning to merge. Luckily he brakes and merges behind you, so you can maintain your own speed.

Scenario 8: Low task demand, goal congruent, situational

You are driving on a **quiet** highway in the middle of the day. There is not much traffic. You **do not have important meetings**: you do not have to be at your destination at a specific time. It is raining heavily. Furthermore, the road is in bad condition: water is splashing up, there are large puddles of water on the road and you can hardly see a thing. The windscreen wipers are working at full speed. Then, you arrive at a road section that has recently been renovated. They have used ZOAB here: the kind of asphalt that absorbs the water, so there does not seem to be any water on the road. Now, the viewing conditions are a lot better.