# Addressing Road Rage: The Effect of Social Awareness in Every Day Traffic Situations – A User Study

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## ABSTRACT

This paper addresses the effect of social awareness on road rage in everyday driving situations. In the user study we conducted subjects experienced three everyday traffic situations. They where either enriched by information about the driver in front or no information was presented. The subject's interaction with the system was limited to angry comments, honking or showing a happy face. We found an effect of presentation condition on the reaction type: When displaying information that matched subject's personal preferences, more friendly reactions were observed than in the other conditions. The results of this study serve as a basis for a large-scale study in a social network.

## Categories and Subject Descriptors

H.5.2 [**Information interfaces and presentation**]: User Interfaces, User-centered design

## 1. INTRODUCTION

Online social networks have become common in the past few years and are broadly accepted today. These networks link people with a "spiritual" proximity but do not consider the "physical" proximity. When the internet got available on todays common smartphones, the social community also got mobile. These ad-hoc communities are the latest developments: Google latitude [2] for example brings together people with same interest and currently being at the same place, therefore overcoming this specific limitation of traditional online social networks. Millions of car drivers who share the same road every day also form a social community. Even though, in contrast to traditional social networks, they share the same "physical" proximity they lack the ability of communicating with each other hence are not able to share their "spiritual" proximity. As a consequence, time pressure and anonymity often cause yelling, shouting and honking (often referred to as "road rage"). The extension to ad-hoc social road communities is at hand since the technical foundations are opening communication channels to each other and current research in the domain of vehicular ad-hoc networks is focusing this topic [1]. While current use-cases are mostly safety related and therefore not addressing anonymity while driving, the underlying technology could easily be used for transferring other data such as social information. Linking together this technology and already existing social networks would significantly decrease the level of anonymity while driving. Decreased anonymity in traffic situations in turn affects road rage as previous studies have shown [3] [4].

In this paper, we examine the effect of social awareness in every day driving situations on road rage. We therefore conducted a user study and presented three distinctive driving situations. The scene was enriched by information about the driver in front which either matched a subject's personal preference or was unrelated to her likings. In a third condition, we showed no additional information at all. The presented scenes slowed down the participant's car and conflicted with the primary goal of reaching the destination within a given time-frame. We limited the possible interactions in these situations to either honk, yell or show a happy face. Our Hypothesis was that realizing the car driver in front has something in common with the own preferences leads to a more friendly reaction. It was further hypothesized that presenting irrelevant or no message provokes a more aggressive reaction. The results of this paper serve as a basis for a large scale experiment in which we will distribute the system as a game in a social network thus reaching a large number of people.



## 2. EXPERIMENTAL STUDY

*Subjects.* 18 subjects (6 female, 12 male) participated in this experiment. The age range was 19 – 40 years with an average of 26 years. All subjects possessed a valid driver's license and were registered on facebook. Note, that facebook requires the user to explicitly confirm that the added application may use personal data.

*Apparatus.* The experiment was conducted in a lab in front of a standard PC. The participants were presented a simulated driving scene which is exemplified in Figure 1, upper left image. The only possible interaction with the system (and therefore taking influence on the scene) was to hit one of the buttons on the bottom (from left to right): *AngryComments*, *Honk* and *HappyFace* which indicated a communication with the driver in front. *AngryComments* and *Honk* were supposed to be negative reactions while *HappyFace* was considered to be positive. An appropriate sound was played when the subject interacted with the buttons. At the beginning of the experiment the car accelerated automatically to 60 kilometers per hour and kept a constant speed. A speed indicator was present on the display on the upper right during the whole experiment as well as a driving sound. The primary goal was to reach the destination within a given time frame indicated by a countdown timer on the upper left of the display.

*Procedure.* The whole experiment lasted for about 10 minutes. Before the experiment started, information was given in written form explaining the course of the task, the user interface and the different scenes. After that, the participant was asked to log in to her/his facebook account and to add our application. After

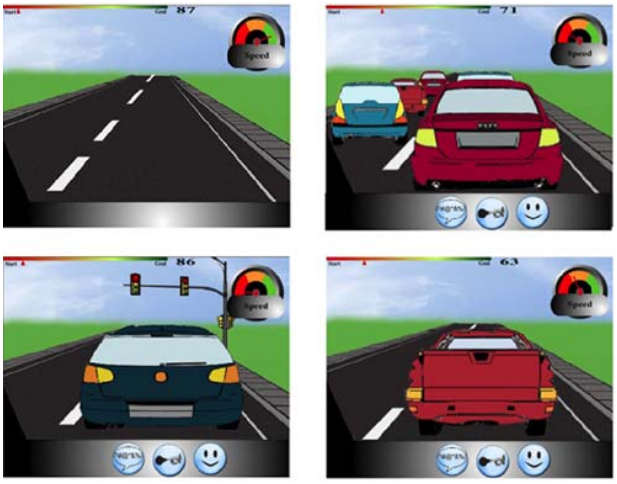

**Figure 1: The displayed scenes. From left to right, top to bottom: Initial scene, *TrafficJam*, *TrafficLight*, *SlowCar***

driving 10 seconds on an empty road at full speed (Figure 1, top left), one of the other scenes slowed down the subjects' car.
During the experiment, we presented three different scenes, namely *TrafficJam*, *TrafficLight* and *SlowCar* (Figure 1). In the first scene the car drives into a traffic jam and gets stuck. The second scene shows a red traffic light and a car in front. After the traffic light turns green the other car ignores the green light and therefore blocking the street. In the third scene the participants' car is slowed down by an upcoming car. After any interaction with one of the buttons in the individual scene, the cars started moving or speeding up again respectively. Each scene occurred twice resulting in presentation of 6 scenes in total in each run.
There were three different conditions of message presentation (*NO_MSG*, *REL_MSG* or *IREL_MSG*). In the first case no additional information is presented. In the other conditions information about the driver in front is used: *REL_MSG* adds information to the scene where the participant most certainly has a preference for, e.g. "The driver in front also studies at Saarland University". This information was retrieved using data from her facebook page. *IREL_MSG* uses information which the subject has no preference for, e.g. "The user in front is born on 24/03/82". The order of the presented scenes was fixed but the order of appearance of *NO_MSG*, *REL_MSG* and *IREL_MSG* between subjects was counterbalanced. Only two presented messages contained personal information, the remaining 4 were either of class *NO_MSG* or *IREL_MSG*. It was never the case that two messages of class *REL_MSG* were presented in a row. The first message presented was always an irrelevant message (*IREL_MSG*). The experiment ended by either indicating that the goal was reached in time or a failure message in case the time was up.

## 3. RESULTS

Figure 2 shows the results over all participants in conditions *NO_MSG* and *IREL_MSG* and *REL_MSG*. When no message is presented (condition *NO_MSG*) we could confirm our hypothesis of more frequent aggressive driver reactions. For presenting general messages which do not match to the personal preferences of the participants according to their social network profile, we could observe similar results. For the presentation of messages which match personal preferences of the participants, we observed a shift from *AngryComments* and *Honk* to *HappyFace*. Due to nominal scaled data, we used a Chi-squared test to check wether our results are statistically significant. We aggregated *AngryComments* and *Honk* as negative reactions and *HappyFace* was the positive reaction. For condition *REL_MSG* subjects more often reacted in a friendly way in comparison to condition *IREL_MSG* ($\chi 2(1) = 8.10, p < .01$) and also in condition *NO_MSG* ($\chi 2(1) = 7.65, p < .01$). This confirms our initial hypothesis: When matching personal preferences about the driver in front are presented, a more friendly reaction can be observed.

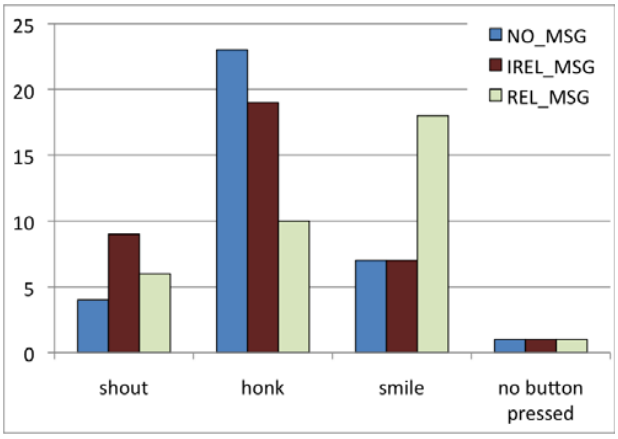


**Figure 2: Frequency of reactions in conditions *NO_MSG*, *IREL_MSG* and *REL_MSG*. We measured significantly more button presses to *HappyFace* in condition *REL_MSG* over conditions *NO_MSG* and *IREL_MSG*.**

## 4. CONCLUSION & FUTURE WORK

This paper presented a user study which investigated the effect of social awareness on road rage in three driving situations. We measured the reaction of participants when altering the situation in terms of messages with or without personal information about the car driver in front or no message at all. We used data available from the subject's social network page since asking obvious questions in advance would compromise the results. When presenting irrelevant messages or no message at all a more aggressive reaction could be observed (compared to when presenting relevant messages). A more friendly reaction could be observed when using the subject's personal preferences according to her facebook page. These results indicate that spiritual proximity has a positive effect on the driver's interactive behavior in cases of physical proximity. They also indicate that already existing information in social networks can be used to realize matching personal preferences. In order to confirm our results, a follow-up study with the results of this paper will be conducted. We will then distribute the system as a game in a large social network hence reaching a larger number of people. These results will influence design and implementation of an in-car social networking application on the basis of V2X.

## 5. ACKNOWLEDGMENTS

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