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# The Effect of Justification and Consequence in Increasing the Effectiveness of Road Signs to Reduce the Number of Traffic Violations by Motorcyclists in Semarang

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## ABSTRACT

The use of road signs is commonly used to reduce traffic violation. However, the number of traffic violation is still high. Literature shows that the number of traffic violation depends on the type of message used in the road sign. This research aimed to know what message is the most effective to reduce the number of traffic violation. Five messages used within this research were 1) neutral message, 2) prescriptive message, 3) proscriptive message, 4) justification message, and 4) consequence message. This research was conducted by observing the compliance of motorcyclists in natural experiment condition (N = 2752). Road signs which used justification message resulted in the highest compliance rate. Road signs which used consequence message showed unexpected result, which decreased the number of motorcyclists' compliance and increased the number of violation instead.

*Keywords: persuasive messages, compliance, prescriptive signs, proscriptive signs, justification, consequence*

## 1. INTRODUCTION

The number of road accident victims in Indonesia who died on the street in 2011-2013 was 82.011 people with more than 720 billion rupiah of material loss [7] In average, 75 people die every day on the road in Indonesia, or 1 death in every 20 minutes. Ironically, 27.035 accident cases in Indonesia happened due to non-compliance behavior of the riders. Based on the data from the R&D of KORAN SINDO (2015), the highest traffic violation type is red light running.

The increase of traffic accident tendency in 2000-2013, as seen in the figure, that traffic accident is an issue which has not been well-resolved in Indonesia. There needs to be a good solution for this traffic accident because this does not only result in the big amount of lives and material damages, but also it affected the economy, considering that accidents on the road caused the economy to lose 2,9% of the Gross National Income [7]. Geller
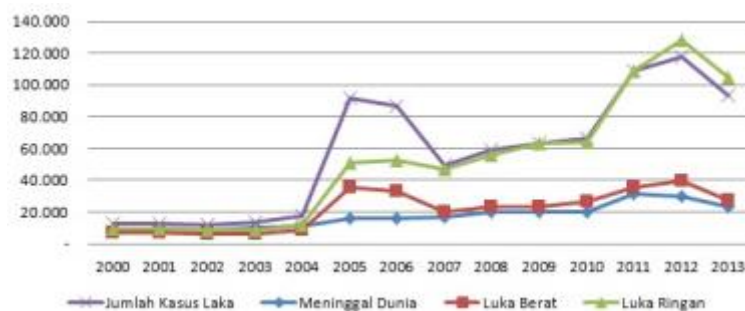


**Figure 1** Data of Traffic Accident in 2000-2013.
*Source*: Taken from https://polmas.wordpress.com/category/safety-driving/

Intervention methods used to improve the secure behavior of riders are basically categorized into three intervention types [5], they are: 1) communication/education strategies,

2) activator-based strategies using antecedent and prompting, and 3) consequence-based strategies using feedback, rewards and penalties. Out of these three, the

second strategy which uses appeal and warning signs, is the most commonly used due to the low-cost of the application [10].

Not all road signs are effective to raise the expected behavior. In order to change the unwanted behavior, the message which uses injunctive norm (e.g., 'Please stop when the light is red') is more recommended rather than the descriptive norm-based one (e.g. 'Too many people do not stop when the red light is on' [2]. In regars to whether the message shall be framed positively or prescriptively (e.g. 'Please stop when the light is red') or negatively or proscriptively (e.g. 'Do not drive when the light is red') still shows contradictive results [3]. Furthermore, there is a research which recommends to include the element of justification (e.g. 'Stopping when the red light is on shows that we respect others' rights to drive') and the element of consequence (e.g. 'breaking through red light means shaming yourself before others') [10].

Regardless of the advancement of the aforementioned researches, those research results were not supported by data from Indonesia. This is very unfortunate because if those assumptions are not valid in Indonesia, therefore policies which used those research results as the basis cannot be considered as a cultural competence intervention for Indonesia, or effective internvention in Indonesian culture. Research Question

Can goal-framing theory explain the effect of 1) message's content (justification vs consequence vs justification and consequence vs neutral) and 2) message's type (prescriptive vs proscriptive) towards the behavior of motorcyclists' violations on red light.

## 1.1. Research Purpose

This research was designed to test the Goal-Framing Theory by comparing the responses of red light users towards the road signs that were differed by the combination of the elements of justification, consequences, prescription, and proscription.

## 1.2. Research Benefits

a. To add the data of findings from Indonesia to develop goal-framing theory.
b. To provide directions for the government and police department of Indonesia in designing good interventions to improve road users' compliance.
c. To provide considerations for the government in designing regulations which are effective in improving road users' compliance.

## 2. METHODS

### 2.1. Identification of Research Variables

The independent variable within this research was the type of message. There were five message types used: 1) prescriptive message, 2) proscriptive message, 3) justification message, 4) consequence message, and 5) neutral message. The dependent variable within this research was the behavior of motorcyclists during red light; they were motorcyclists who complied with the red light and motorcyclists who violated the red light.

### 2.2. Research Subject

The subject of the research was motorcyclists in several traffic light areas in Semarang when the red light was on.

The technique used was incidental sampling with 2752 research subjects.

The observation result was analyzed using logistic regression to see what type of road sign message was the most effective to suppress the violation of motorcyclists towards the red light in Semarang.
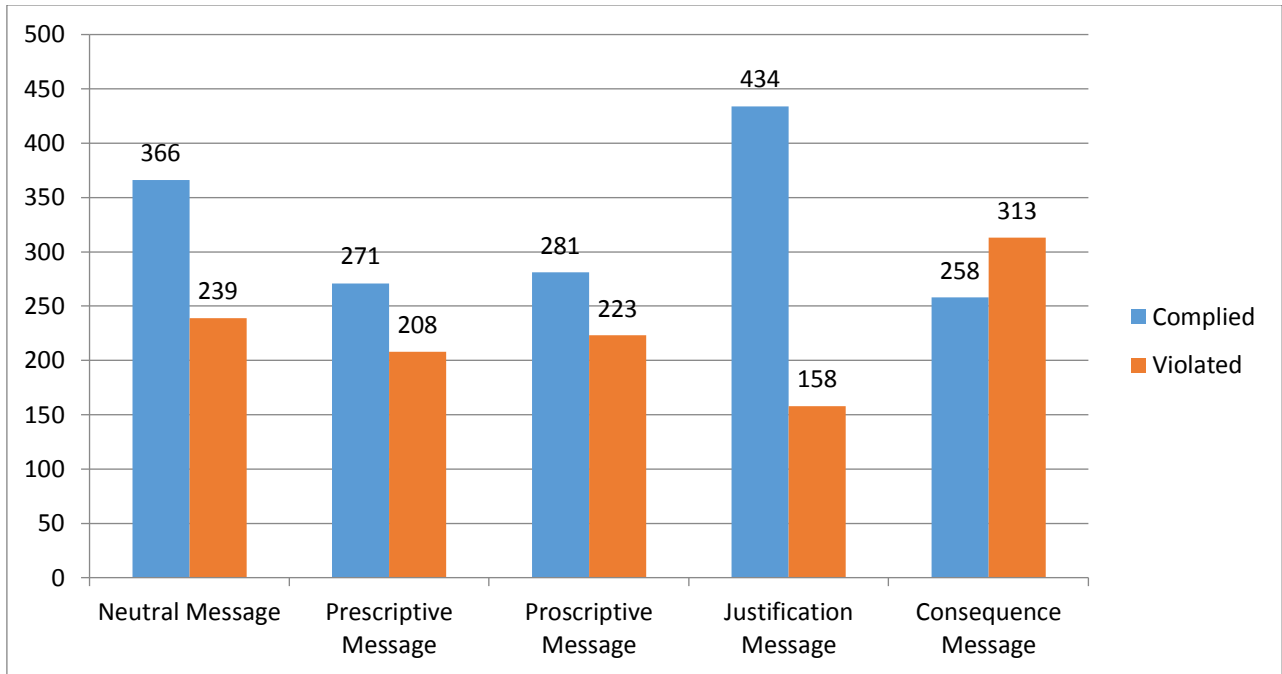
### 2.3. Research Stages

The data collection method of the research was observation, to obtain the survey data. Survey sheets consisted of several observation items: number of subjects on the spot when the incident was happening, the number of red light violators, the number of red light violators who initiated the violation, and the number of red light violators who violated after seeing others violated.

After the data were obtained, they were analyzed statistically to obtain the description of the red light violators' behavior and the difference significances on the violation number for each type of road sign.

This research was experimental-quantitative research in which the independent variables were freely manipulated by the researcher.

## 3. RESULT AND DISCUSSION

Descriptive analysis displayed interesting findings. As expected, justification message was more effective in suppressing the number of violation compared to neutral message (27% violation for justification message VS 40% violation for neutral message). However, it was unexpected to find that consequence message resulted more violations compared to neutral message (55% for consequence message VS 40% for neutral message). The comparison can be seen on the chart below:

The following is the result detail of the logistic regression analysis:

**Case Processing Summary**

| UnweightedCases[a] | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 2752 | 100.0 |
| | Missing Cases | 0 | .0 |
| | Total | 2752 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 2752 | 100.0 |

a. If weight is in effect, see classification table for the total number of cases.

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95.0% C.I.for EXP(B) Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|
| Step 1[a] | Neutral(1) | .619 | .118 | 27.430 | 1 | .000 | 1.858 | 1.473 | 2.342 |
| | Prescription | -.458 | .125 | 13.463 | 1 | .000 | .633 | .495 | .808 |
| | Proscription | -.424 | .123 | 11.919 | 1 | .001 | .654 | .514 | .832 |
| | Justification | -1.197 | .125 | 91.528 | 1 | .000 | .302 | .236 | .386 |
| | Constant | -.426 | .083 | 26.260 | 1 | .000 | .653 | | |

a. Variable(s) entered on step 1: Neutral, Prescription, Proscription, and Justification.

**Variables not in the Equation[a]**

| | | | Score | df | Sig. |
|---|---|---|---|---|---|
| Step 0 | Variables | Neutral(1) | 1.269 | 1 | .260 |
| | | Prescription | .887 | 1 | .346 |
| | | Proscription | 1.921 | 1 | .166 |
| | | Justification | 67.137 | 1 | .000 |
| | | Consequence | 52.648 | 1 | .000 |

a. Residual Chi-Squares are not computed because of redundancies.

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95.0% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| Step 1[a] | Neutral(1) | .619 | .118 | 27.430 | 1 | .000 | 1.858 | 1.473 | 2.342 |
| | Prescription | -.458 | .125 | 13.463 | 1 | .000 | .633 | .495 | .808 |
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a. Variable(s) entered on step 1: Neutral, Prescription, Proscription, and Justification.

Based on this research, 0,000 significanceshowed that all methods in this experimental study wassignificant to compare the compliancebetween different road signs. Its supported some researches, such as Mikler and Almakadma'sin 2016, which showedthat culture and government programs significantly influencedattitude and behavior of risky driving, Gupa and Ozlean, 2019 showed that government program significantly influencedthe compliance on safety riding after five years application. Other research showed that road infrastructure, regulation and enforcement could improve traffic safety in Nigeria;and in Indonesia road sign was very effective to improve traffic compliance.

The people of Indonesia are traffic compliant when there is a traffic officer on the road. In this research, observation and experiment were conducted in natural situation, when there was no traffic officer guarding, and the research subjects (riders) could actually have breached the traffic when there was no obstacle of another vehicle in front of them. In another word, the subjects were riders to stop on the first line after the red light (N=2752). The warning signs with justification message apparently showed the highest compliance rate compared to the others. Interestingly, warning signs with consequence message apparently decreased the motorcyclists' compliance on the traffic light and increased the violation number instead.

Road sign with justification message was found to be more effective to make the motorcyclists to comply. The message's sentence was: "Good people comply with the traffic light". Consequence message: "Violating traffic light means disrespecting others"; persuasive message: "Let's comply with the traffic light". Prescriptive message: "do not violate the traffic light". Neutral message: "This is a traffic light".

The cultural traits of Indonesians are generous, friendly, and love to be complimented. They like to care and help each other in their relationship. Indonesians like to abbreviate long words or terms. Abbreviated names become more accepted and well-known rather than the long version. In Indonesia, the value of *gotong royong* (communal aid) is upheld. Indonesians believe that humans need each other to reach a certain goal or simply to help each other out. This value has become a cultural habit where people would simply help anyone in need without asking for anything in return because they know that it is the right thing to do. Further, to maintain good relationship with each other, they often compliment others and it makes them feel better. Thus, road signs with justification words are more effective than consequences words to apply to Indonesians.

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