

Development of Indonesian Driving Anger Scale

Leksmono Suryo Putranto, Dwi Ch. Suryana, and Sunu Bagakara

Abstract—This paper is intended to develop Indonesian Driving Anger Scale by adopting several items of driving anger short scale developed by Deffenbacher et al in the USA. The respondents were asked to rate the amount of anger that would be provoked from none at all, a little, some, much and very much if the items in the questionnaire were actually happened. Respondents were 176 car drivers or motorcycle riders aged at least 17 years old and hold a valid driving license from Greater Jakarta. The proportion of respondents by gender was 116 males and 60 females. There were only 4 items trigger anger more than average (more than mean score 3.00), i.e. other driver yell at you rudely (3.90), someone weaving in and out of traffic (3.67), other driver drove very slowly in the fast lane and therefore slowing traffic (3.26) and someone backs right out in front of you without looking (3.68). Male respondents (2.85) were significantly ($\alpha=0.003$) more hot-tempered than female respondents (2.55) in terms of mean score of 14 items.

Index Terms—Driving anger scale, trigger anger, drivers yell.

I. INTRODUCTION

Motorization increase is rapidly in large cities in Indonesia. Therefore traffic accident is also increased. One of factors which possibly influence driving safety is anger.

Several studies explained the role of emotions and their effect to driving [1-5]. On their daily live, drivers experienced various types of emotions. Among various types of emotions, anger and fear were the most frequent happened [3]. Driving anger can cause various problems to the drivers [6]. On the other hand, fear was the most frequently happened to novice drivers [7-8].

Anger is a strong emotion related to aggressive and negative attitude towards the cause of anger and generally accompanied with muscle tension and stimulus of autonomous neural system [9]. Anger generally happened as a response to real threat, present behavioral disorder or as a response towards danger perception [10-11].

Parkinson [12] conducted a study using questionnaires to ask several items regarding anger frequency in driving and

non-driving contexts. He concluded that emotion in the form of anger was more frequently happened in driving compared to non-driving contexts. Research conducted by [13] using diaries concluded that happiness (54%) was the most frequent form of emotions during driving, followed by anger (22%) and fear (8%).

The consequence of emotion while driving such as speeding and accident involvement were also studied by several researchers. Arnett et al [14] conducted a study where they asked the participants to record their activities in 10 days. They found that anger was correlated with speeding, i.e. when the participants were angry, they tend to violate speed limit compared to non-angry situation. Underwood et al [13] also found that anger was related with accident or near-miss accident. Moreover, Deffenbacher et al [15] stated that in driving simulation, it was revealed that driver with high anger tend to drive in higher speed compared to non-angry driver.

Several researchers tried to explain why anger increased less-systematic processing style (in this case more heuristic). One possibility was based on affect-as-information approach [16], i.e. anger is basically an act as a signal of “take action now, think later!” This signal encouraged an individual to involve in a behavior which does not need deeper calculation. Anger is a “primitive emotion related with a relatively simple action (such as opposing) and consequently anger might probably trigger simple way of thinking (heuristic) rather than analytic. Likewise, anger might indicate dangerous or threatening environment. To be able to immediately save for such situation, a quick action is required. The need for quick action triggers heuristic processing approach. Therefore anger decreases motivation to involve in a controlled and systematic process.

Anger as an emotional response to certain situation is called as anger state and related to instant physiological and autonomous stimulus and muscle tension preparing the body to take action. This physical response will return to the baseline again after a specific situation overcome. On the other hand anger trait is related to general character of an individual to experience anger in various contexts and different situations. Individual with high anger trait has a general tendency to interpret surrounding events as threat to their ego and values. As a result, anger trait people with higher anger state will get angry more frequently than general populations [1].

Driving anger become a serious public problem because it may trigger driving behavior disorder [15, 17, 18]. Driving

L. S. Putranto is with the Department of Civil Engineering, University of Tarumanagara, 11440, West Jakarta, Indonesia (e-mail: lexy_putranto@yahoo.co.id).

D. C. Suryana is with the Department of Civil Engineering, University of Tarumanagara, 11440, West Jakarta, Indonesia.

S. Bagakara is with the Faculty of Psychology, University of YARSI, 10510, Central Jakarta, Indonesia.

behavior disorder may contribute to road accident, causing serious injuries, fatalities and property damages [19-21]. According to [19], driving behavior disorder at least consists of three driving behaviors, i.e. aggressive driving, risky driving and driving error. These behaviors may threaten road safety.

Stephens and Groeger [22] studied whether emotions affect driving behavior in a simulator. There were 24 participants conducted simulated driving. During driving, they faced several traffic events designed to disturb their travel. Whilst in the simulator, participants were asked to rate their emotion. There were three types of emotions observed, i.e. frustration, calmness, and anger. The results show high anger and frustration and low calmness. Moreover, participants experienced anger, driving faster even in a dense traffic condition.

Garrity and Demick [23] studied relationship between driving performance and emotional state. In this research, they recruited an experienced observer to evaluate participant driving performance. The results show that emotional state was related to alertness. Participant with high depression, anger and fatigue scores was less alert compared to participant with low depression, anger and fatigue scores.

One mechanism that could explain causal relationship between anger to risky driving behavior is that an angry person does not think deeply about the future. These imply that angry person intension is far from the future and the consequences which may come [24]. There are several reasons behind this. Firstly, there were many problems in the past which may trigger an individual anger, especially events with violation of justice norms. Anger has deep "long impact" in a way that individual memory of events in the past often be able to trigger risky behavior. In this case, anger represents a kind of "primitive" emotion rooted to an individual memory on past events [25].

This paper is intended to develop Indonesian Driving Anger Scale by adopting driving anger scale developed by [26] in the USA. The full scale version [26] used 33 items classified into six subscales (hostile gestures, illegal driving, police presence, slow driving, and discourtesy and traffic obstructions. The short scale version consists of 14 items (the shortest possible scale that had adequate reliability and assessed the same sources of variance as the full scale). At first the authors decided to directly adopt the 14 items in the short scale version. However after conducting some discussions with local experts regarding the appropriateness of the items to reflect driving behavior in Indonesia, we exchanged four items in the short scale version with four items in the full scale version from the same cluster.

II. METHOD

The items in the full scale version of Driving Anger Scale [26], if grouped into six clusters were as follow (S indicates item in short scale version; I indicates selected item for Indonesian version):

TABLE I
DRIVING ANGER SCALE

Group	Item Description	Scale Version
Hostile Gestures	Someone makes an obscene gesture toward you about your driving	S
	Someone honks at you about your driving	S, I
	Someone yells at you about your driving	
Illegal Driving	Someone is driving too fast for the road conditions	
	Someone is weaving in and out of traffic	S, I
	Someone runs a red light or stop sign	S, I
	Someone is driving way over the speed limit	
Police Presence	You see a police car watching traffic from hidden position	I
	You pass a radar speed trap	S
	A police officer pulls you over	S, I
	A police car is driving in traffic close to you	
Slow Driving	Someone in front of you does not start up when the light turns green	
	A pedestrian walks slowly across the middle of the street slowing you	
	Someone is driving too slowly in the passing lane holding up traffic	I
	Someone is driving slower than reasonable for the traffic flow	
	A slow vehicle on a mountain road will not pull over and let people by	S
	Someone is slow parking and holding up traffic	S, I
	Someone is driving right up on your back bumper	
	Someone cuts in right in front of you in the freeway	
Discourtesy	Someone cuts in and takes the parking spot you have been waiting for	
	Someone backs right out in front of you without looking	S, I
	Someone coming toward you does not dim their headlights at night	
	At night someone is driving right behind you with bright lights on	
	Someone speeds up when you try to pass them	S, I
	Someone pulls right in front of you when there is no one behind you	
	A bicyclist is ring in the middle of the lane and slowing traffic	S, I
Traffic Obstructions	You are stuck in a traffic jam	S, I
	You hit a deep pothole that was not marked	
	You are driving behind a truck which has material flapping around in the back	
	You are driving behind a vehicle that is smoking badly or giving off diesel fumes	
	A truck kicks up sand and gravel on the car you are driving	S
	You are driving behind a large truck and you cannot see around it	S, I
	You encounter road construction and detours	I

Respondents were 176 car drivers or motorcycle riders aged at least 17 years old and hold a valid driving license from Greater Jakarta. Altogether, there were 86 online respondents and 90 direct interview survey. The proportion of respondents by gender was 116 males and 60 females. Although there were 101 respondents who rode the motorcycle daily and 75 respondent who drove the car daily but there were 87 respondents who hold both motorcycle rider and car driver licenses. The remaining 89 respondents were either holding motorcycle rider or car driver licenses. Most of the respondents (170) were under 40 years old or fall within younger adult age group. 75% of the respondents were riding motorcycle or driving car more than 3 times a week. The respondents were asked to rate the amount of anger that would

be provoked from none at all, a little, some, much and very much if the items in the questionnaire were actually happened. The respondents also asked to answer some general questions in the beginning, i.e. name, gender, age, type of vehicle used daily, type of possessed driving/ riding licenses, etc. Mean difference analysis was conducted with significant level of 0.05 between gender, age group, type of vehicle used daily, type of possessed licenses and frequency of weekly travel.

III. ANALYSIS AND DISCUSSION

Table II summarizes the overall data. It can be seen that There were only 4 items trigger anger more than average (more than mean score 3.00), i.e. other driver yell at you rudely (3.90), someone weaving in and out of traffic (3.67), other driver drove very slowly in the fast lane and therefore slowing traffic (3.26) and someone backs right out in front of you without looking (3.68). Yelling to the others is considered to be very hostile in Indonesian culture. Weaving in and out of traffic is considered to be very dangerous behavior. On the other hand the respondents did not mind to be pulled over by the police (1.78). This might reflect general attitude of the public towards the police (not necessarily respect them, but at least apprehend their law enforcement duties). Respondents also did not mind drive behind a large truck and were not able to see around it (1.92). Again this might reflect public apprehension to mobility difficulties of large trucks.

TABLE II
SUMMARY OF THE DATA

No.	Item Description	Mean Score
1.	Someone honks at you about your driving.	2.02
2.	Someone honks at you about your driving.	3.90
3.	Someone is weaving in and out of traffic.	3.67
4.	Someone runs a red light or stop sign.	2.85
5.	A police officer pulls you over.	1.78
6.	You see a police car watching traffic from hidden position.	2.53
7.	Someone is slow parking and holding up traffic.	2.87
8.	Someone is driving too slowly in the passing lane holding up traffic.	3.26
9.	Someone backs right out in front of you without looking.	3.68
10.	Someone speeds up when you try to pass them.	2.71
11.	A bicyclist is riding in the middle of the lane and slowing traffic.	2.77
12.	You are stuck in a traffic jam.	2.47
13.	You encounter road construction and detours	2.18
14.	You are driving behind a large truck and you cannot see around it.	1.92

Table III shows mean difference of items scores between genders. It can be seen that for all statistically significant mean difference pairs, female mean scores were lower than male mean scores. There were seven pairs with statistical significant difference, i.e.: someone runs a red light or stop sign, a police officer pulls you over, you see a police car watching traffic from hidden position, someone speeds up when you try to pass them, a bicyclist is riding in the middle of the lane and slowing traffic, you are stuck in a traffic jam and you encounter road construction and detours. These imply that for those seven items, female respondents were less angry

compared to male respondents. It might be due to the characteristics of the item which were not related to sensitive female feelings. Hostile gestures seem to affect more anger to female respondents although in two items reflecting hostile gestures the mean differences were not statistically significant. In terms of overall mean, the instrument affect less anger to female respondents (2.55) compared to male respondents (2.86). This pair was statistically significant (0.003).

TABLE III
MEAN DIFFERENCE OF ITEMS SCORES BETWEEN GENDER

No.	Item Description	Mean Score			α	Significant (Yes/No?)
		Male N=116	Female N=60	Difference		
1.	Someone honks at you about your driving.	1.97	2.10	-0.13	0.459	No
2.	Someone honks at you about your driving.	3.89	3.93	-0.04	0.806	No
3.	Someone is weaving in and out of traffic.	3.66	3.67	-0.01	0.988	No
4.	Someone runs a red light or stop sign.	3.09	2.40	0.69	0.002	Yes
5.	A police officer pulls you over.	1.91	1.53	0.38	0.014	Yes
6.	You see a police car watching traffic from hidden position.	2.78	2.05	0.73	0.001	Yes
7.	Someone is slow parking and holding up traffic.	3.00	2.63	0.37	0.068	No
8.	Someone is driving too slowly in the passing lane holding up traffic.	3.33	3.12	0.21	0.277	No
9.	Someone backs right out in front of you without looking.	3.71	3.62	0.09	0.622	No
10.	Someone speeds up when you try to pass them.	2.84	2.43	0.41	0.043	Yes
11.	A bicyclist is riding in the middle of the lane and slowing traffic.	2.90	2.52	0.38	0.048	Yes
12.	You are stuck in a traffic jam.	2.63	2.15	0.48	0.009	Yes
13.	You encounter road construction and detours	2.39	1.78	0.61	0.001	Yes
14.	You are driving behind a large truck and you cannot see around it.	1.98	1.80	0.18	0.272	No
Mean		2.86	2.55	0.31	0.003	Yes

Tables IV through 6 show that in general there were no statistically difference in the 14 items between age group, type of vehicle, type of possessed license and frequency of weekly travel. The only pair with statistically significant mean difference was overall mean of vehicle type (Table V). Surprisingly motorcycle riders responded less anger to overall items of the instrument compared to car drivers. This might be due the nature of the original questionnaires [26] which was prepared for car drivers. Interesting results of statistically significant mean difference of overall mean between gender (0.31) and between vehicle type (0.067). Those quite marginal difference values can be statistically significant due to lower variance of overall mean compared to individual items means.

In the vehicle type case, it was even more dramatic because overall mean difference was statistically significant although none of mean difference of individual items were statistically significant.

TABLE IV
MEAN DIFFERENCE OF ITEMS SCORES BETWEEN AGE GROUP

No.	Item Description	Mean Score			α	Significant (Yes/No?)
		≥ 40 years N=6	< 40 years N=170	Difference		
1.	Someone honks at you about your driving.	2.83	1.99	0.84	0.056	No
2.	Someone honks at you about your driving.	3.67	3.91	-0.24	0.611	No
3.	Someone is weaving in and out of traffic.	3.50	3.67	-0.17	0.733	No
4.	Someone runs a red light or stop sign.	3.33	2.84	0.50	0.406	No
5.	A police officer pulls you over.	1.83	1.78	0.06	0.899	No
6.	You see a police car watching traffic from hidden position.	2.67	2.52	1.43	0.813	No
7.	Someone is slow parking and holding up traffic.	3.00	2.87	0.13	0.655	No
8.	Someone is driving too slowly in the passing lane holding up traffic.	3.33	3.25	0.08	0.874	No
9.	Someone backs right out in front of you without looking.	3.17	3.69	-0.53	0.270	No
10.	Someone speeds up when you try to pass them.	3.33	2.68	0.65	0.222	No
11.	A bicyclist is riding in the middle of the lane and slowing traffic.	2.83	2.76	0.07	0.892	No
12.	You are stuck in a traffic jam.	2.00	2.48	-0.48	0.367	No
13.	You encounter road construction and detours	1.83	2.19	-0.36	0.484	No
14.	You are driving behind a large truck and you cannot see around it.	2.17	1.91	0.25	0.558	No
Mean		2.82	2.75	0.067	0.827	No

Both overall (14 items) mean value of the result in Table III (gender group) and Table IV (vehicle type group) were still less than 3.00 (the departure between low anger to high anger). However, if a priority should be taken regarding socialization of anger control, the above results imply that male and car driver groups should be prioritized.

TABLE V
MEAN DIFFERENCE OF ITEMS SCORES BETWEEN TYPE OF VEHICLE

No.	Item Description	Mean Score			α	Significant (Yes/No?)
		Motor-cycle N=101	Car N=75	Difference		
1.	Someone honks at you about your driving.	1.78	2.33	-0.55	0.001	Yes
2.	Someone honks at you about your driving.	3.81	4.03	-0.22	0.223	No
3.	Someone is weaving in and out of traffic.	3.59	3.76	-0.17	0.365	No

No.	Item Description	Mean Score			α	Significant (Yes/No?)
		Motor-cycle N=101	Car N=75	Difference		
4.	Someone runs a red light or stop sign.	2.67	3.09	-0.42	0.055	No
5.	A police officer pulls you over.	1.65	1.95	-0.30	0.072	No
6.	You see a police car watching traffic from hidden position.	2.45	2.64	-0.19	0.382	No
7.	Someone is slow parking and holding up traffic.	2.73	3.07	-0.34	0.083	No
8.	Someone is driving too slowly in the passing lane holding up traffic.	3.11	3.45	-0.34	0.063	No
9.	Someone backs right out in front of you without looking.	3.55	3.84	-0.29	0.103	No
10.	Someone speeds up when you try to pass them.	2.65	2.77	-0.12	0.540	No
11.	A bicyclist is riding in the middle of the lane and slowing traffic.	2.65	2.92	-0.27	0.148	No
12.	You are stuck in a traffic jam.	2.47	2.47	0.00	0.995	No
13.	You encounter road construction and detours	2.11	2.28	-0.17	0.366	No
14.	You are driving behind a large truck and you cannot see around it.	1.91	1.93	-0.02	0.892	No
Mean		2.65	2.89	-0.24	0.031	Yes

TABLE VI
MEAN DIFFERENCE OF ITEMS SCORES BETWEEN TYPE OF POSSESSED LICENSE

No.	Item Description	Mean Score			α	Significant (Yes/No?)
		A&C N=87	A/C N=89	Difference		
1.	Someone honks at you about your driving.	1.98	2.06	-0.08	0.624	No
2.	Someone honks at you about your driving.	3.90	3.91	-0.01	0.938	No
3.	Someone is weaving in and out of traffic.	3.70	3.63	0.07	0.692	No
4.	Someone runs a red light or stop sign.	2.87	2.83	0.04	0.847	No
5.	A police officer pulls you over.	1.85	1.71	0.14	0.378	No
6.	You see a police car watching traffic from hidden position.	2.68	2.38	0.30	0.178	No
7.	Someone is slow parking and holding up traffic.	3.00	2.75	0.25	0.195	No
8.	Someone is driving too slowly in the passing lane holding up traffic.	3.31	3.20	0.11	0.557	No
9.	Someone backs right out in front of you without looking.	3.64	3.71	-0.07	0.712	No
10.	Someone speeds up when you try to pass them.	3.63	2.78	-0.15	0.460	No
11.	A bicyclist is riding in the middle of the lane and slowing traffic.	2.84	2.70	0.14	0.436	No
12.	You are stuck in a traffic jam.	2.41	3.52	-0.11	0.595	No

No.	Item Description	Mean Score			α	Significant (Yes/No?)
		A&C N=87	A/C N=89	Difference		
13.	You encounter road construction and detours	2.20	2.17	0.03	0.886	No
14.	You are driving behind a large truck and you cannot see around it.	1.86	1.98	-0.12	0.465	No
Mean		2.78	2.74	0.04	0.721	No

TABLE VII
MEAN DIFFERENCE OF ITEMS SCORES BETWEEN WEEKLY TRAVEL
FREQUENCY USING PRIVATE VEHICLE

No.	Item Description	Mean Score			α	Significant (Yes/No?)
		≤ 3 times N=44	> 3 times N=132	Difference		
1.	Someone honks at you about your driving.	2.07	2.00	0.07	0.714	No
2.	Someone honks at you about your driving.	3.82	3.93	-0.11	0.573	No
3.	Someone is weaving in and out of traffic.	3.66	3.67	-0.01	0.969	No
4.	Someone runs a red light or stop sign.	2.89	2.84	0.05	0.844	No
5.	A police officer pulls you over.	1.66	1.82	-0.16	0.395	No
6.	You see a police car watching traffic from hidden position.	2.52	2.53	-0.01	0.976	No
7.	Someone is slow parking and holding up traffic.	2.89	2.87	0.02	0.939	No
8.	Someone is driving too slowly in the passing lane holding up traffic.	3.14	3.30	-0.16	0.423	No
9.	Someone backs right out in front of you without looking.	3.59	3.70	-0.11	0.571	No
10.	Someone speeds up when you try to pass them.	2.80	2.67	0.13	0.588	No
11.	A bicyclist is riding in the middle of the lane and slowing traffic.	2.80	2.76	0.04	0.844	No
12.	You are stuck in a traffic jam.	2.61	2.42	0.19	0.380	No
13.	You encounter road construction and detours	2.05	2.23	-0.18	0.400	No
14.	You are driving behind a large truck and you cannot see around it.	2.07	1.87	0.20	0.280	No
Mean		2.75	2.76	-0.01	0.973	No

IV. CONCLUSIONS AND RECOMMENDATION

From this paper, it can be concluded that:

1. The Indonesian Driver Anger Scale in this paper was mostly using the short scale version of [26]. However some items were replaced with items from the full scale version of [26] to maintain relevance with Indonesian drivers/ riders behaviour context.
2. The level of anger of the respondents was relatively low. There were only four out of fourteen items in the

instrument which had mean score above three (the departure value from not angry to angry).

3. When the respondents face real driving/ riding situations listed in the instrument, female respondent was less angry compared to the male respondents.
4. In the vehicle type case, the overall mean difference was statistically significant although none of mean difference of individual items were statistically significant. This might be due the nature of the original questionnaires [26] which was prepared for car drivers.

It is recommended to test the Indonesian Driver Anger Scale to more respondents with more diverse driving culture and condition from different parts of Indonesia.

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