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A Study on the Possibility of Retaliatory Driving against Car Klaxon's Sounds

Ik-Soo Ahn[1]
[1]*Information and Telecommunication of Department, Soongsil University, Seoul, Korea.*
369, Sangdo-ro Dongjak-gu, Seou

[1]*Orcid Id: 0000-0003-1144-1963*

Myung-Jin Bae [*2]
[2]*Information and Telecommunication of Department, Soongsil University, Seoul, Korea.*
369, Sangdo-ro Dongjak-gu, Seou

Orcid Id: 0000-0002-7585-0400
*(*Correspondence author)*

Seong-Geon Bae [3]
[3]*School of Software Application, Kangnam University, Gyunggido, Korea.*

Orcid Id: 0000-0003-3252-0062

Abstract

Korea is the sixth largest producer of global finished cars, and more than 20 million cars are registered among about 51.66 million people. This means that the automobile life is so common that half of the population has cars. But the driving culture is so bad that it is ashamed that it is an automobile advanced country. I think wrong honking culture is the one of that reason. In this paper, we analyze the klaxon's sound which is responsible for the induction of reprisal driving, the changes of the psychological state and body of the driver who responds to it, check the EEG and blood pressure and conduct the MOS test. As a result, the possibility of retaliation mind increased in proportion to the intensity and length of the Klaxon sound, and it was found that the nervous change klaxon sound sounds mixed with the emotions cause the most severe retaliation mind possibility. Through this study, we will try to find a way to use the right automobile klaxon sound and establish etiquette of klaxon culture to create a mature driving environment.

Keywords: Automobile life, driving culture, reprisal driving, klaxon's sound, changes of the psychological state, etiquette

INTRODUCTION

According to the Korea Automobile Manufacturers Association, Korea's ranking of global finished car producers is ranked 5th in the world after 2005, followed by France by the end of 2016 and 6th by 2017. Although the ranking has been one step lower, it is in a position to become one of the world's leading automobile producers. According to the Ministry of Land, Transport and Maritime Affairs, Korea registered more than 2.18 million cars at the end of 2016. Considering that the total population in Korea is about 51.7million, it has been surveyed to have one car in every 2.37 people. However, in spite of the fact that it is a developed country in the automobile industry. It is shamed that traffic accidents and deaths are at the top of OECD countries. The reason of this can be presumed to be due to the habitual rough driving caused by the situation where the driver's license can be easily acquired, the lack of personality education for the driver, and the urgent nationality quickly due to the culture. Harsh and rushed driving and fierce publicness are combined with the consciousness of the damage, and it is expressed more strongly when only the steering wheel is caught. As a representative example, if you think that you are disturbed or injured by driving by others, self-defense and aggression are combined, and the cases of retaliation in which you fight against each other on the road suddenly increase. The retaliatory driving has become a serious social problem because it leads to major accidents and even to assault and murder. In particular, there are cases of retaliatory driving that occur due to the beginning of the sound of the klaxon, and it is urgent to educate about the use of klaxon etiquette. The reason for the retaliatory driving is that the injured car who thinks that the injured car was injured by the psychological impact on the injured car which threatened or surprised the opponent car due to illegal driving and did not apologize and the driver who was psychologically damaged by illegal driving of the opponent When he warns klaxon to warn him, he may be forced to retaliate by becoming angry, depending on the degree of klaxon sound. An example of retaliation by klaxon's tone is that a person react only the reason that mistakenly made an unauthorized driving and was unaware that the other driver had suffered mental harm. Secondly, while knowing that an opponent driver has suffered mental damage due to illegal driving by his / her opponent, the warning klaxon sound of the driver of the opponent may be carried out because of a bad feeling. In this way, we can realized that the response of the klaxon is different depending on the method

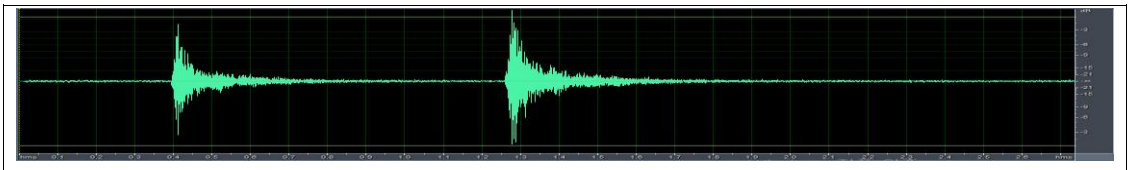
of using the klaxon. In this paper, we investigate how the teste reacts after six sets of klaxon are used. The acoustic characteristics of the various klaxon sounds were analyzed by using various methods such as EEG, blood pressure, and oxygen saturation check. In order to investigate the response to the comprehensive klaxon sound, a method of checking the order of the klaxon sounds that are likely to induce retaliation by applying the moss test was also performed in parallel.[1][2][3]

ANALYSIS OF KLAXON'S SOUNDS CHARACTERISTIC

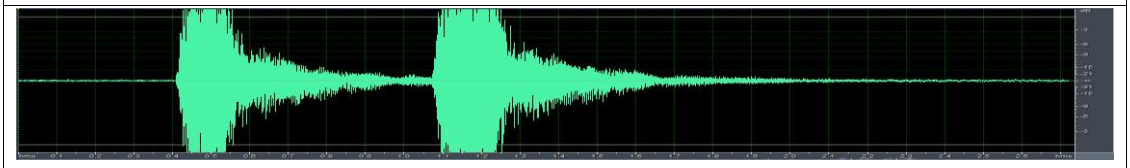
We analyzed the acoustic characteristics of each hour, the energy characteristics of sound, and the acoustic characteristics of each frequency. Through the time domain graph, we confirm the acoustic characteristics of the duration of the klaxon speech. Through the spectrogram graph, the sound energy of the voiced klaxon sound is confirmed. The spectral analysis graph shows the frequency characteristics of the klaxon sound. The klaxon sound was recorded in stereo from a basement parking lot to a digital SD recorder at a 90-degree angle from a distance of 5 meters ahead. Sound tools for sound analysis were auditioned and analyzed at 48,000 Hz, mono environment.

Analysis of Klaxon's Sounds Time domain

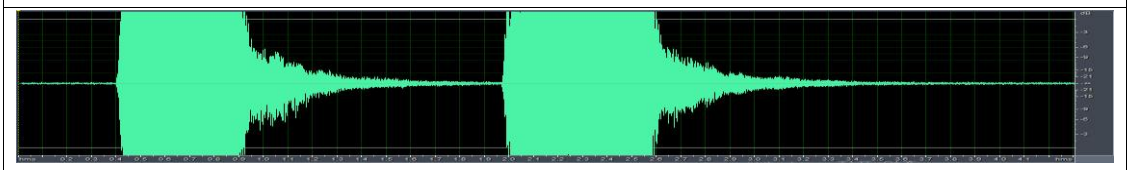
To confirm the acoustic characteristics of the duration of the klaxon sound, a time domain graph was verified. By comparing the time domain graphs of the klaxon sounds, it is possible to analyze how the klaxon sounds were uttered. Through the time domain graph of klaxon's notte, we focus on the duration of the vocalized klaxon tone.



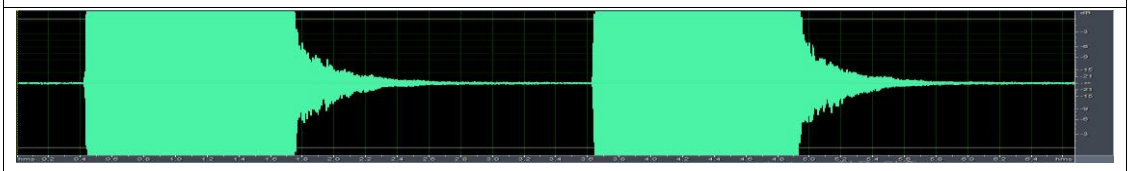
a. Time domain graph of Klaxon 1's sound



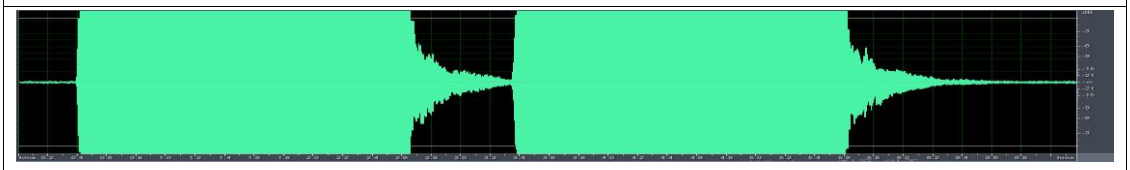
b. Time domain graph of Klaxon 2's sound



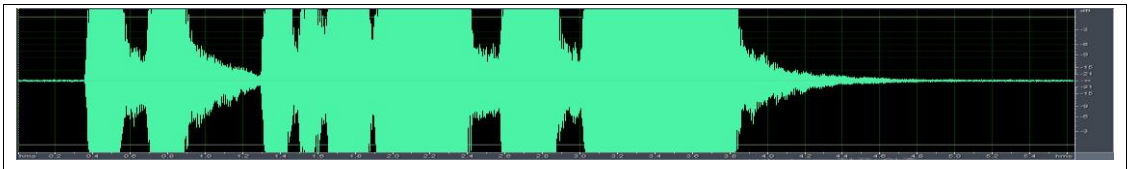
c. Time domain graph of Klaxon 3's sound



d. Time domain graph of Klaxon 4's sound



e. Time domain graph of Klaxon 5's sound



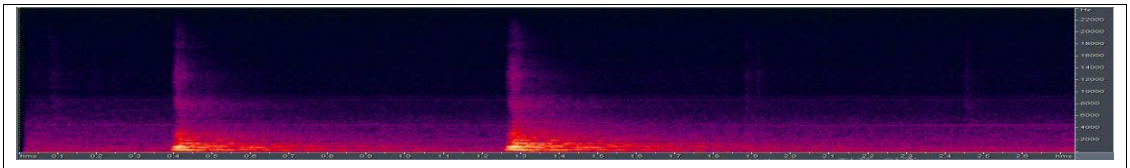
f. Time domain graph of Klaxon 6's sound

Figure 1. Time domain graph of Six Klaxon's sounds

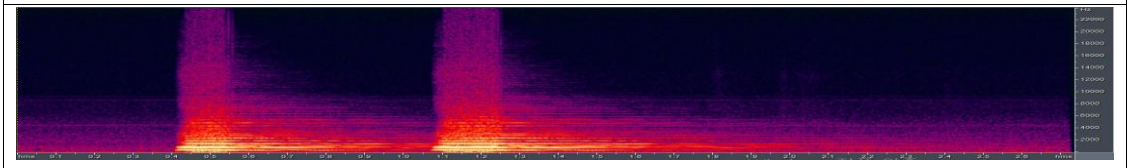
From a to f, the graphs show the shapes of the six klaxon tones of the klaxon sounds 1 to 6 in the form of wave forms over time. Figure 1 shows that the time domain graph from a to e is progressively stronger and longer than the time domain graph. This shows that the intensity and duration of the klaxon tones 1 to 5 are two times stronger and longer. The time domain of graph shows a different shape from the five time domain graphs above, and it can be seen that it is expressed as irregular voicing by pressing a short or long klaxon in a strong and various way as a whole.

Analysis of Klaxon's sounds spectrogram graph

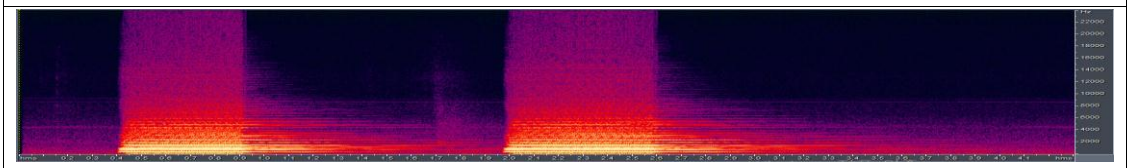
The spectrogram graph was confirmed to confirm the acoustic characteristics of the energy of the klaxon sound. The klaxon's spectrogram graph shows how strong the klaxon was. Through the spectrogram graph of the klaxon sound, we focus on the sound energy of the spoken klaxon sound.



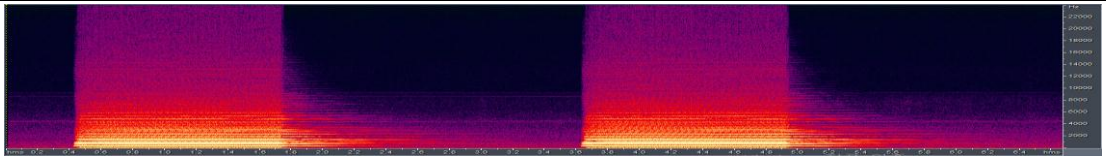
a. Spectrogram graph of Klaxon 1's sound



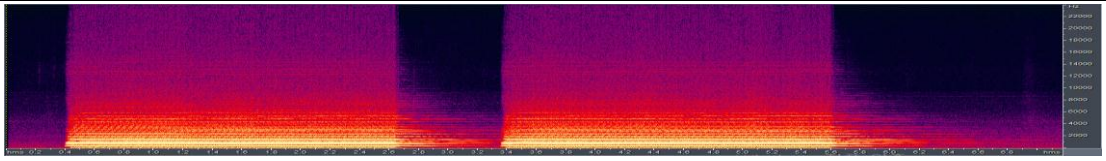
b. Spectrogram graph of Klaxon 2's sound



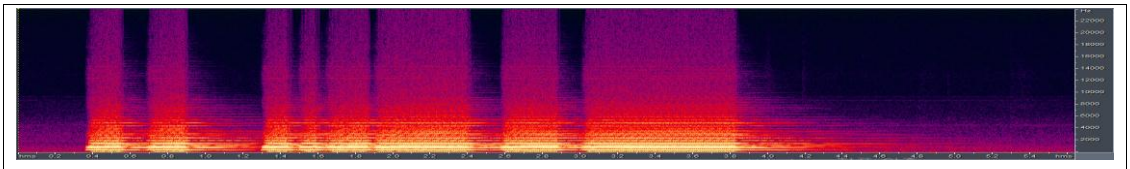
c. Spectrogram graph of Klaxon 3's sound



d. Spectrogram graph of Klaxon 4's sound



e. Spectrogram graph of Klaxon 5's sound



f. Spectrogram graph of Klaxon 6's sound

Figure 2. Spectrogram graph of Six Klaxon's sounds

The klaxon notes 1 through 5 show the same pattern and number of times the klaxon is pressed, but the longer and stronger the longer and stronger the stimulant energy is generated. The klaxon tone 1 is very short and weak, so it can be confirmed that the klaxon tone is generated by pressing. The klaxon tone 5 is a very long and strong sound that is generated by pressing the klaxon. The klaxon sound 6 was a short way to press the cactus. You can see that it has been lengthened and pressed several times to disperse the sound but keep the energy strong.

Comparison & Analysis of Klaxon's sounds spectrum graph

The spectral analysis graph shows the frequency characteristics of the klaxon sound and compares the frequencies of the five klaxon sounds with the same frequency.

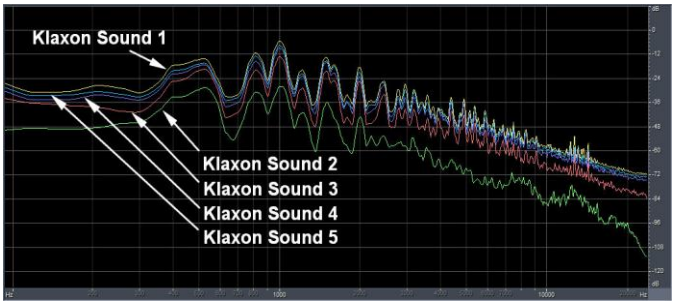


Figure 3. Spectrum comparison graph for Six Klaxon's sounds

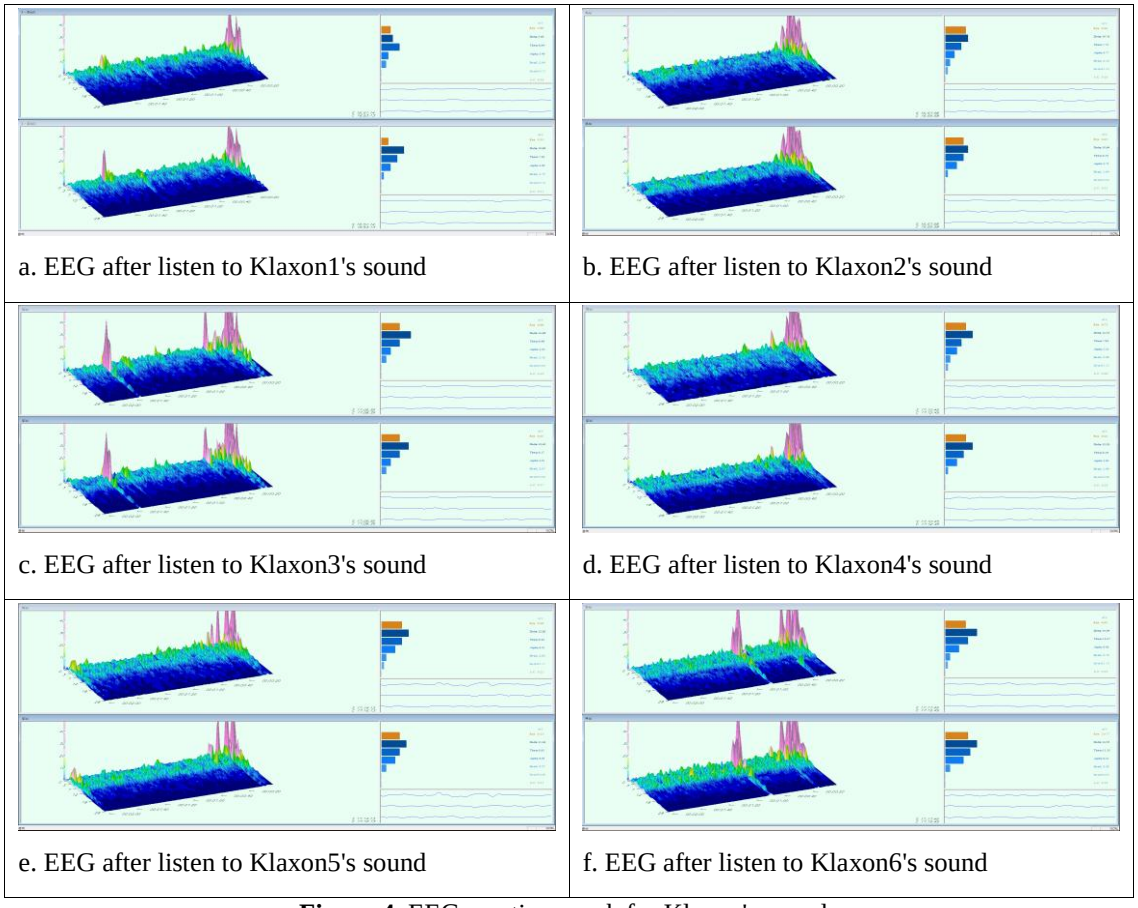
The frequency characteristics of the klaxon sound are composed of sound components that stimulate the human ear to form several large and small formant peaks from 400 Hz to 4,000 Hz. Especially, the highest pitch is formed at 1,000Hz, so that it is a sound characteristic that effectively awakens the human auditory function. In the frequency characteristic comparison graph of the five klaxon sounds, the klaxon sounds have the same frequency characteristics, but the longer and stronger the klaxon is, the higher the dB range over the entire frequency band. It can be seen that according to the length and intensity of klaxon. The emotions are stimulated more and more through human hearing.

RESEARCH ON RETALIATION DRIVING POSSIBILITY

Studies on the possibility of retaliation against klaxon's sound were conducted through EEG analysis, stress index survey, and moss test because the problem of human psychology responding to sound was involved. EEG analysis can analyze the possibility of repetitive operation in relation to the characteristics of EEG by analyzing the EEG changes of human left and right brain responding to klaxon's sound. The stress index by type of klaxon's tongue showed the degree of stress by checking blood pressure, pulse rate and oxygen saturation. In the Morse test, the listeners who listened to the klaxon sound analyzed the responses expressed in consideration of the possibility of retaliating their emotions depending on the degree of klaxon's sound. [4]

EEG analysis by type of Klaxon's sounds

EEG(Electroencephalogram) analysis can be interpreted by analyzing EEG changes in human left and right brain responding to klaxon's sounds. The changes of the EEG measured by listening to the six klaxon tones show that the changes of Delta, Theta, and Alpha waves are high. In other words, the significant change in ALPA is interpreted as a sign of a strong antipathy toward the klaxon tone, which means that brain activity is happening vigorously. Moreover, the fact that the change of the alpha wave is increasing from the first Klaxon to the sixth Klaxon, indicates that the degree of the reaction is increasing according to the degree of the Klaxon sound. The fact that the klaxon tone is strong and long, especially in the sixth to sixth, and the irregularity of the long tones, suggests that the change of klaxon tone increases and becomes stronger because of the strong and long irregular tone of the klaxon tone In the first place.



a. EEG after listen to Klaxon1's sound

b. EEG after listen to Klaxon2's sound

c. EEG after listen to Klaxon3's sound

d. EEG after listen to Klaxon4's sound

e. EEG after listen to Klaxon5's sound

f. EEG after listen to Klaxon6's sound

Figure 4. EEG reaction graph for Klaxon's sounds

Table 1. Change of EEG by Klaxon's sounds

EEG ＼ klaxon		klaxon1	klaxon2	klaxon3	klaxon4	klaxon5	klaxon6
Delta	Left	5.63	10.76	13.96	12.10	12.80	14.04
	Right	10.69	10.64	12.40	12.03	11.04	14.55
Theta	Left	8.64	7.75	8.96	7.84	9.40	10.27
	Right	7.59	8.10	8.17	8.16	8.81	11.35
Alpha	Left	3,49	4.77	4.30	5.25	6.01	6.88
	Right	4.69	5.75	4.81	5.62	6.93	8.41
Beta L	Left	2.84	2.10	2.19	2.89	2.62	2.76
	Right	1.75	1.84	2.07	1.98	2.27	2.42
Beta H	Left	0.75	1.01	0.94	1.31	1.17	1.14
	Right	0.70	0.83	0.88	0.89	0.89	0.97

Unpleasantness survey by type of klaxon's sounds

We investigated the degree of discomfort that the driver hears and hears the klaxon sound, and suggests the possibility of reprisal driving. Blood pressure, pulse, and oxygen saturation were checked for discomfort. This is an experiment based on the fact that when a person's emotions get stronger, their blood pressure rises and their pulse gets faster. Oxygen saturation was also checked because the oxygen saturation was significantly lowered when the stress was increased. The degree of discomfort was calculated based on blood pressure, pulse, and oxygen saturation, and the possibility of retaliation was evaluated based on the results. [5] [6]

Table 2. Change in discomfort according to Klaxon's sounds

a. Blood pressure and pulse measurement

b. Oxygen saturation and pulse measurement

Inspection items \ Klaxon	Blood pressure		pulse	Oxygen saturation
	max	min		
Klaxon1	119	66	61	99.82
Klaxon2	123	68	62	99.76
Klaxon3	123	69	63	98.80
Klaxon4	126	65	63	95.70
Klaxon5	127	74	64	88.77
Klaxon6	128	82	64	86.75

The average normal blood pressure range of the normal twenties is 120mmHg to 75mmHg. The pulse rate is 50 to 60 times per minute for a healthy adult, and 50 times for a person who has a constant exercise such as a marathon. In addition, the oxygen saturation of the human body is normal from 95% to 100%. Based on these criteria, we examined the changes in blood pressure, pulse and oxygen saturation after six klaxon sounds. According to Table 2 above, as you listen to the klaxon sounds from 1 to 6, your blood pressure is getting higher, your pulse getting faster, and the oxygen saturation getting lower. This means that the discomfort increases gradually. The longer the length of the klaxon sound becomes, the stronger the discomfort increases as the intensity increases, and the more irregular the greater the discomfort is, the greater the possibility of reprisal driving.

MOS test of retaliation driving possibility for Klaxon's sounds

Morse test for analysis of possibility of retaliation driving ability by klaxon sound is the score of klaxon listening to the klaxon sound and the reaction expressed by considering the possibility of retaliating his feeling depending on the length. It is an experiment expressed. The clavicle sounds for the study were six from level 1 to level 6, and the listener, who listened to and scored the score. Speakers used to monitor the klaxon sound were the M200MKIII model of Swan Speaker System Inc of AC 220V, 60Hz, and 130W capacities, which can best represent actual sounds.

Table 3. MOS test of retaliation driving possibility for Klaxon's sounds

listener \ Klaxon's sounds	Klaxon1	Klaxon2	Klaxon3	Klaxon4	Klaxon5	Klaxon6
listener1	1	2	3	3	4	5
listener2	1	2	3	5	5	4
listener3	1	2	4	4	5	5
listener4	1	2	3	4	5	5
listener5	1	2	5	3	4	4
Average	1	2	3.6	3.8	4.6	4.6

Highest score: 5 points, the higher the score, the more likely it is to induce retaliation driving

The responses of the listener who listened to the klaxon tune are shown in Table 3, and the test was used to determine the cause of the possibility of causing reprisal driving of the klaxon tune when judged by the average score, although there were some differences in the listener of six. The listener who listened to the voice of Klaxon 1 gave the lowest score to all five listener. This is interpreted to mean that the other person's klaxon sound is taken lightly. Second, the Klaxon2 was a little stronger than the klaxon 1, but gave 5 points to each of the two listeners who judged it to be a sound that would alert the driver to the attention. It is interpreted as a klaxon sound that is understandable rather than klaxon1. However, the reaction of klaxon3 was different from that of klaxon1 and 2. Of course, the listener who gave 3 points was the highest number of 3, but there was also a listener who gave 4 points and the highest score of 5 points. This is interpreted as a score based on the result of the unexpected expression of the gentleman, klaxon1 and klaxon2, which are different from what they thought would be three points. I felt that the sounds of the klaxon 1 and klaxon2 were carefully thought out, but the klaxon3 seemed to be relatively rude, making it four and five. Klaxon4 got an average score similar to Klaxon3. Slightly different point is that there are 3 people in the Klaxon3, 3 in the Klaxon4, 2 in 4, 2 in the Klaxon4, and 5 in the Klaxon3. This suggests that Klaxon4 is out of comprehension as compared to Klaxon1 and klaxon2, and more rejection than klaxon3. Klaxon5 has the highest score as expected, with four points for two and five for three. This score is interpreted as meaning that you are stressed enough to cause anger and fight. Finally, klaxon6, like klaxon5, had two 4point and five 5point crossover, and klaxon3 and listener4 gave the same 5 points as Klaxon5. Listener1 gave 4points of Klaxon5 and 5points of Klaxon6, which caused the greatest stress on irregular and strong klaxon sounds rather than strong and long Klaxon sounds. Listener2 was different from listener1 in that it had stronger and longer klaxon tones and a tendency to appeal to greater stress than irregular klaxon tones, indicating that some people were more disliked with simple, uniform and strong continuing sounds. On the other hand, listener5 gave 5 points, which was the most stressed on klaxon3, and 4 points on klaxon5 and klaxon6, which gave the most stress when you were just out of comprehension, very strong and long Klaxon sounds, Sound is interpreted as being rather cool or accepting it as an accident or an emergency. In general, it was found that strong and irregular klaxon sounds give the most discomfort and cause reproductive operation possibility.

RESULT

In order to investigate the possibility of retaliatory driving against klaxon sounds, we analyzed the characteristics of six klaxon sounds and analyzed the effect of klaxon sound on human body by focusing on possibility of retaliation. First, the time domain, spectrogram, and spectrogram graph were analyzed to analyze the acoustic sound of the klaxon sound. As a result, it was confirmed that the klaxon's tone changes depending on the intensity and intensity of pressing the klaxon. Klaxon 1 is a weak, short, double-tapping sound that I'm sorry for. The klaxon 2 is larger than the klaxon 1, but it is soft and short. The klaxon 3 is a somewhat stronger sound with a middle length and intensity in the six klaxon sounds. Klaxon 4 is a longer, stronger sound that begins to feel the limits of patience. Klaxon 5 is a very strong and long-lasting sound, which makes it angered by ordinary people. Klaxon 6 was analyzed to sound very uncomfortable with a strong, short or long, irregular sound. Next, we analyzed EEG, discomfort, and moss test for the possibility of repetition of klaxon sound.

As a result, the change of the alpha wave which is most related to brain activation was the largest in the EEG. In the blood pressure and pulse, oxygen saturation test, and moth test analysis for discomfort investigation, it was confirmed that the probability of reprisal operation increases as the intensity of klaxon tone becomes longer and longer. The results of the study show that a strong, long - lasting Klaxon sound and a strong and varied Klaxon sound are expressed in a mixture of nervous emotions of the person pressing the Klaxon, which is likely to cause reprisal driving. The purpose of this study is to propose the use of klaxon and etiquette education for the driver who is driving license as well as the existing driver. At the same time, it suggests a need to standardize the use of klaxon according to cases and circumstances. That is, we promise and know how to use each klaxon according to caution, warning, danger, audit, etc. We suggest that you try to use klaxon as an etiquette practice method for using klaxon and try to prevent traffic accident and retaliation by searching for the right driving environment through klaxon etiquette education.

CONCLUSION

The traffic environment in Korea has been overreacting speed and signal violation, and intervention, abrupt driving and threat driving have long been beyond the concession, and concession driving has disappeared. Among them, retaliatory driving which is emerging as a social problem nowadays is increasingly causing various kinds of thinking. This is a bad image for tourists visiting Korea in the global era, and it is raising concerns that the national image will be lost. For example, Korea has the highest average rate of car accidents in the OECD, so it is long time to write a stigma called the world-wide traffic accident kingdom. Especially nowadays, the accident caused by retaliatory driving is soaring, and there is a great possibility that a large accident will increase more. Especially, it is very likely to induce reparations by klaxon sound, so I think it is time to be interested in klaxon use etiquette. For this reason, in this paper, we have investigated the possibility of how the klaxon sound can induce retaliation. As a result, it was found that the longer and stronger, the rougher and the irregular, the more likely it is to induce retaliation. In other words, we found that the correct method of using klaxon should be short, smooth, concise and clear. I hope that this study will give you a chance to think about the correct Klaxon etiquette and understand the other person's Klaxon sound. Furthermore, based on the results of this study, it is expected that etiquette rules for the method of using klaxon will be established and the correct culture of using klaxon will be formed. In addition, I hope that the results of this study will be shared with the Driver's License Test Management Corporation so that the contents of the Klaxon

etiquette will be examined as a problem concerning the driver's licensing and psychiatric field.

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