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A Study on the Causes of Revenge Psychology of Klaxon Sound

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Abstract:

klaxon is an essential part of cars, it can warn of danger and prevent accidents. At fact, existing klaxon sounds always cause trouble, and as the traffic environment becomes more and more complicated, revenge driving caused by klaxon sound becomes a serious social problem. Therefore, there is an urgent need to improve the existing klaxon sound. But the basis for improvement is that the cause of retaliation caused by the existing klaxon sound must be found out. In order to develop better improvements, it is necessary to study its cause. In the paper, because the rhythm klaxon sound does not cause revenge, a comparative analysis was performed on the existing klaxon sound and the repeated rhythm klaxon sound, and found that different durations of klaxon sounds have different effects on our psychology. The brain waves analysis and MOS-Test verified the cause .

Keyword: existing klaxon sound, repetitive rhythm klaxon sound, revenge, causes, spectrum, brainwaves

1. INTRODUCTION

With the number of cars is gradually increasing, the road environment is more complicated, and traffic congestion is causing people to use klaxon more frequently. The noise problem of road environment is also more serious. Revenge driving caused by klaxon sound has become a serious social problem. It is a fact that the existing klaxon sound is likely to cause psychological stress and revenge. klaxon has existed for hundreds of years, but it has not been improved very well to solve this problem. In previous research by The Sori Sound Engineering Research Institute (SSERI), it was found that rhythmic klaxon sounds are good at preventing retaliation. People prefer rhythmic klaxon sounds. Because it brings less psychological stress. But the persistent loud noise of existing klaxon sound can be irritating and cause revenge. Therefore, in this paper, comparing the two types of klaxon sound, then the reason for the revenge psychology induced by the existing klaxon sound is explored. Research the causes of retaliation caused by the existing klaxon sound, then we can find better ways to improve the sound of klaxon by focusing on these causes. Therefore, it becomes necessary to study the causes of the revenge of the klaxon sound [1] [2].

In the second chapter of this paper, the existing klaxon sound and repetitive rhythm klaxon sound are analyzed and compared in time and frequency domain. In chapter3, by letting the tester listen to the two klaxon sounds separately, and the tester's brain waves are measured and analyzed. In chapter 4, conclusions.

2. TIME AND FREQUENCY DOMAIN ANALYSIS OF KLAXON SOUND

In this study, perform sound waveform and spectrum analysis on existing klaxon sound and repetitive rhythm klaxon sound. It is showed that these two sounds have different waveforms in the time domain. The sound waveform of the existing klaxon sound is continuous. But the sound waveform of the repetitive rhythm klaxon sound is intermittent. Analyzing the two types of klaxon sounds from the perspective of frequency spectrum, it also found that the energy distribution of the two sounds in the frequency domain is very different [3] [4].

Figure 1 shows that in the case of the existing klaxon sound, continuing to hear relatively loud sounds can easily lead to ear fatigue, which will cause the driver to drive with revenge. On the other hand, when people hear the recurring rhythms klaxon sound of periodic appearance and disappearance, because the sound disappears for a short time, the ear can get rest and relieve fatigue, such sound does not cause revenge [4].

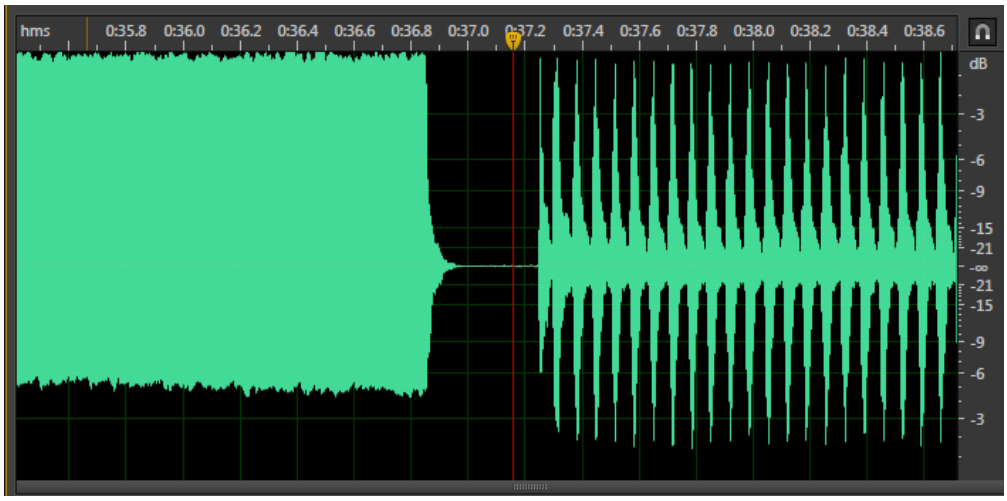

Fig1. (left) waveform of existing klaxon sound, (right) waveform of repetitive rhythm klaxon sound

Comparing the energy distribution diagrams of the two klaxon sounds at various frequencies can find their differences in Fig.2. For the existing klaxon sound, a large amount of energy is distributed below 5KHZ, but there is also many energy, at each harmonic above 5kHZ The energy of the repetitive rhythm klaxon sound is mainly distributed below 4KHZ. Harmonic energy above 4KHZ is very small. Compared with repetitive rhythmic klaxon sound, although the energy of the low-frequency component of the existing klaxon sound is similar to that of the repetitive klaxon sound, the existing klaxon sound has more high-frequency component energy, and excessive high-frequency component energy will Makes ears more prone to fatigue. This is why the existing klaxon sound is more likely to cause retaliation. [6] [7] [8].

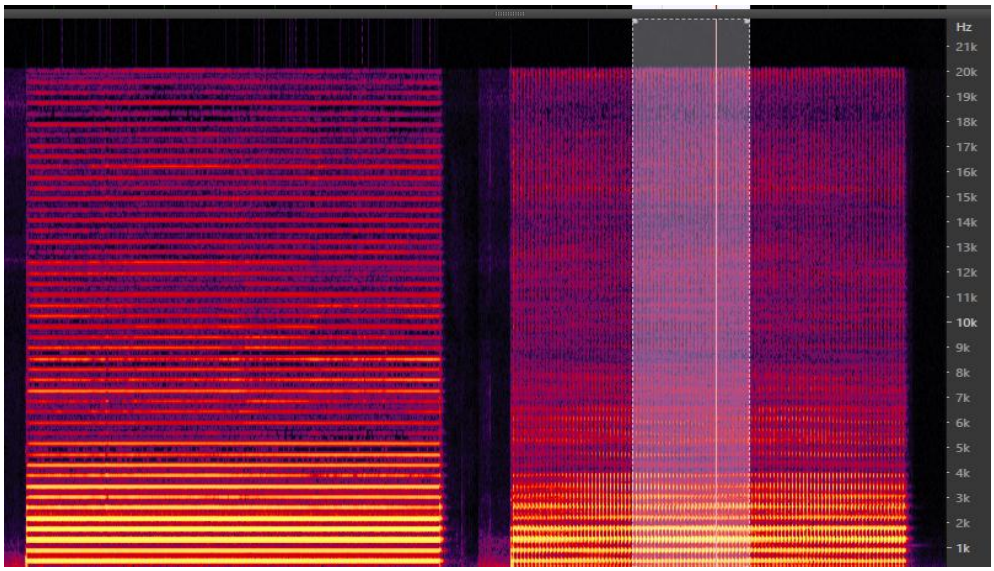

Fig 2. Spectrogram of existing klaxon sound(left) and repetitive rhythm klaxon sound(right)

The basic frequency of klaxon sound is 400 ~ 500HZ. Peak energy occurs at both its harmonic and fundamental frequencies. It can be seen from the figure 3, for the existing klaxon sound, except that the peak-to-valley value of 5.5KHZ to 7.5KHZ becomes smaller. Peak and valley values in other frequency domains remain large. Compared with the existing klaxon sound, the peak and valley value of the repetitive rhythm klaxon sound is smaller than the existing klaxon sound at 0 ~ 4KHZ, and above 4KHZ, the peak-valley value of repetitive rhythm klaxon sound is much smaller than the existing klaxon sound. If the sound has a high peak-to-valley value, that is, the energy varies greatly in the frequency domain. It means that the ear must withstand large changes in sound pressure levels in different frequency domains, which makes the ear endure a lot of pressure and cause the ear to become tired quickly. This is one of the reasons why the existing klaxon sound can easily induce revenge [9][10] [11].

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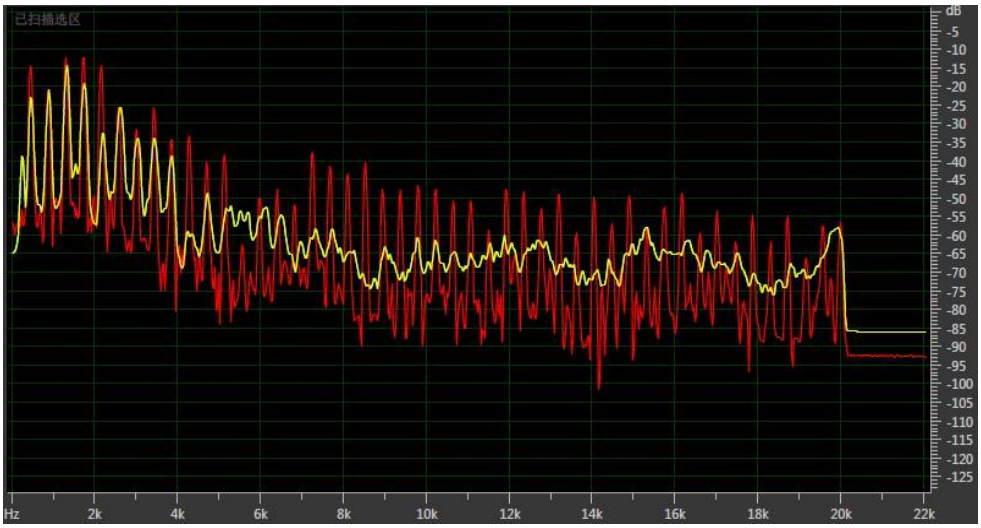

Fig 3. Spectrum of frequency existing klaxon sound (Red)and repeat rhythm klaxon sound(yellow).

3. EXPERIMENTS AND RESULTS

3.1 Brain wave analysis

Brain wave measurements are performed in a relatively quiet space. A 22-year-old man with normal hearing was used as the test subject. Then place the subject at a distance of one meter from klaxon. Provide the tester with brainwave detection equipment and ask him to close his eyes. when start the measurement, first, klaxon emits a repetitive rhythm klaxon sound for one minute. The brain wave of the test subject is measured. Then let the test subject take a two-minute break, and klaxon emits a exiting klaxon sound for one minute. Measure the brain waves. Finally, the brain waves of the test subjects were obtained in two different sound environments [12]

As shown in Fig4, δ waves and Θ waves are brain waves that generate in large numbers during light sleep and deep sleep. When a large number of such brain waves are generated, the brain is in a non-working state without subjective consciousness and action, and enters a dormant state. α waves are brain waves that are produced in large quantities when we are quiet and resting. Makes us consciously alert. βL waves and βH waves are waves that we generate in normal working conditions. At this state, we are most sensitive to outside perceptions and can react faster. However, if these two types of brain waves are continuously produced in large quantities, it will cause emotional fluctuations, tension, anxiety and anger [13] [14].

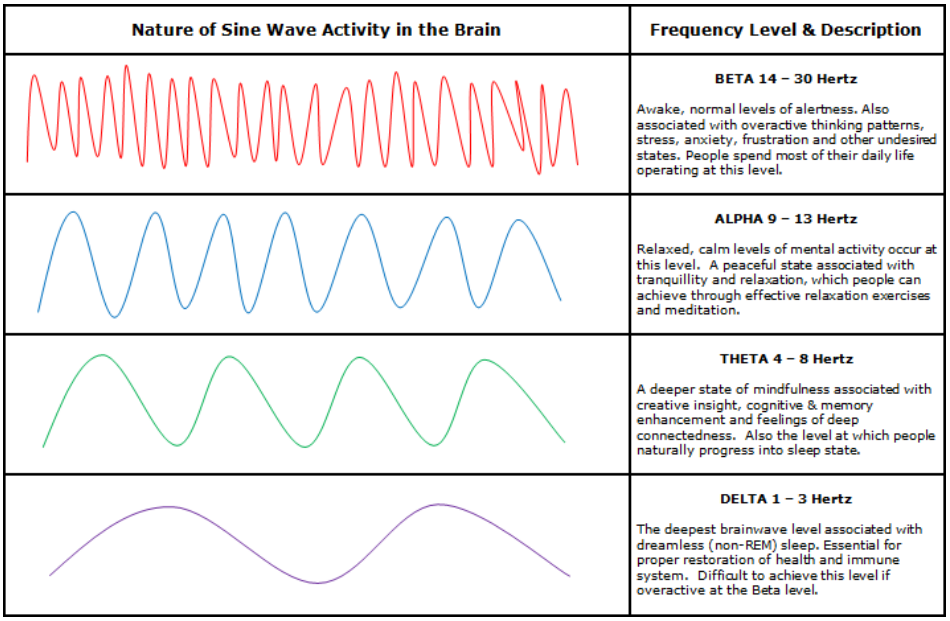

Fig 4. 4 types of brain wave

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Comparing the brain wave images of the two klaxon sounds in fig 5 and fig 6, It can be seen that the βL and βH waves of the repetitive rhythm klaxon sound are larger than the existing klaxon sound. This shows that repeated rhythm klaxon sound attracts more attention and has a better alert effect than Existing klaxon sound. Existing klaxon sound will cause people to generate more δ and Θ waves, and less α waves. It will cause people to fall into weakly easily and weaken their perception of the outside world. The brain cannot maintain its current working state normally. So it can be irritating, disturbing, and induce revenge. On the contrary, repeated rhythm klaxon sound produces less δ waves and Θ waves, but generates more α waves, leaving the brain in a state of normal rest and quietness and calming people's psychology. And because there are more α waves, the brain will be consciously alert to the outside world, and able to sense outside dangers. It also shows that Repeated klaxon sound will have a better alert effect [13] [14].

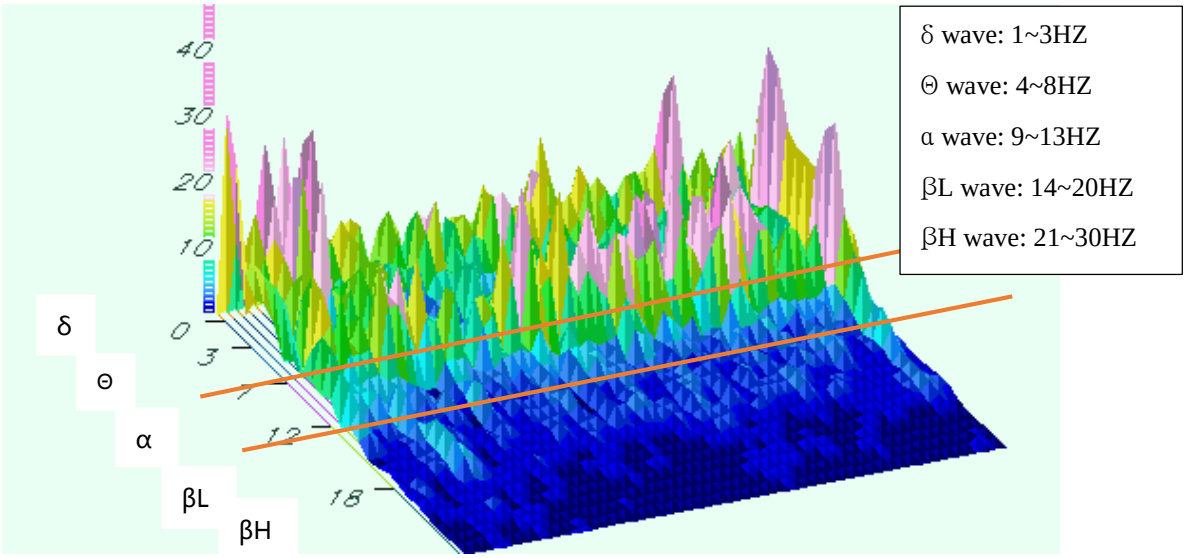

Fig 5. Brain waves with repetitive rhythm klaxon sound

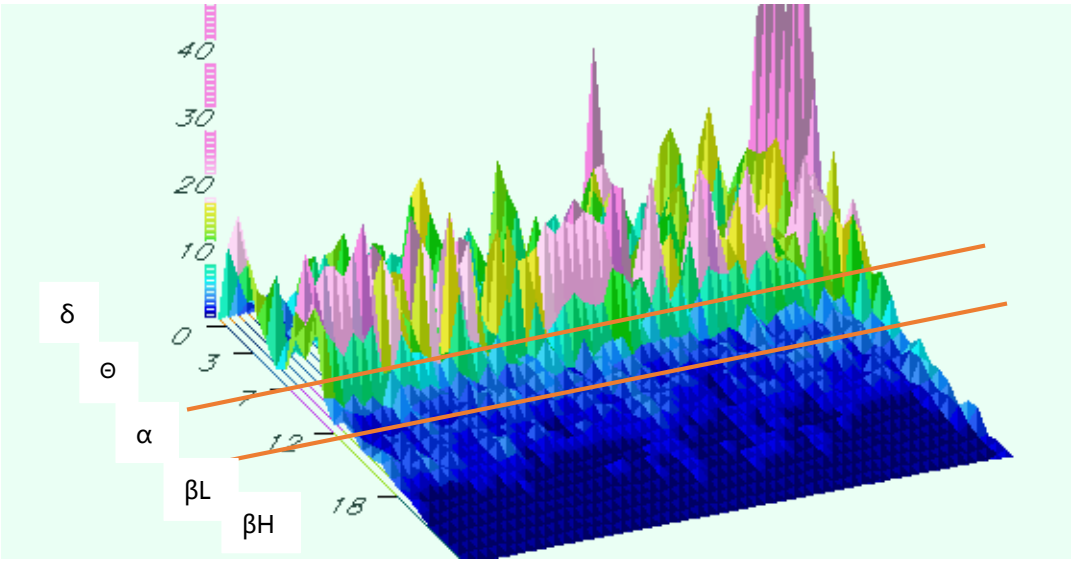

Fig 6. Brain waves with existing klaxon sound

3.2.MOS-TEST

Finally, we took 25 males and 25 females, who were on average around 22 years old, as test subjects, and divided the existing

klaxon sound under test into 5 different durations (1s, 2s, 3s, 4s, 5s). After the tester listens to these five segments of klaxon sound of different lengths, they will give their own evaluations. Evaluation criteria are set into five categories: 1. Comfortable, 2. Boring, 3. Impatient, 4. Testiness, 5. Furious. Test results show that when people hear klaxon sound for one second, the evaluation is: boring. When klaxon sound lasts for two seconds, people will feel impatient. When the duration lasts more than three seconds, people will show anger and more impulse, resulting in revenge. Therefore, people's long-term exposure to the sound of existing horns is also the cause of revenge [15].

MOS TEST Table					
Appraise / Amount / Time	Comfortable	Boring	Impatient	Testiness	Furious
1 second	1	45	4	1	0
2 second	0	5	32	12	1
3 second	0	2	8	28	12
4 second	0	0	5	26	19
5 second	0	0	2	25	23

Table 1. MOS-TEST results

4. CONCLUSION

In the time domain analysis of existing klaxon sounds and rhythmic klaxon sounds, it is found that the existing klaxon sound has a long duration and is likely to cause revenge. But repeating rhythm klaxon sound won't. Therefore, a loud voice that lasts for a long time is the first reason of revenge. This has also been verified in MOS-Test. In the spectrum analysis of sounds, the existing klaxon sound has high peak-to-valley value in the entire auditory frequency range. The amplitude of the waveform is large. High peak-to-valley values can also cause ear fatigue. This is the second reason that can easily induce retaliation.

In the study, analysis of the brain waves displayed by the two klaxon sounds revealed that the existing klaxon sounds could inhibit the generation of α waves in the brain, and produce a large number of delta waves and Θ waves and a small amount of β waves. This can cause the brain to become fatigued and weakly, and not to maintain normal work. For people who are concentrating on something, it will reduce their Work efficiency, break in their attention, and produce anger and irritability. This explains why the existing klaxon sound induces revenge.

After finding the cause of the revenge of the existing klaxon voice, we can find better ways to improve the klaxon sound. For example, giving klaxon rhythmic pattern is a good way to prevent retaliation. Therefore, we can improve the existing klaxon sound by reducing the duration of the klaxon sound, making the energy distribution of sound waves more uniform in the frequency domain and suppressing the generation of δ and Θ waves.

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