

A Study on a Foley Sound of Tiger Roaring Sound

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Abstract: The purpose of this research is to compare and analyze Actual and Foley Tiger Roaring Sound of tiger to develop it into cultural contents. Tiger Roaring Sound is a popular sound effect used to symbolize anxiety or satire when making movie, drama, and audio book. Today, its Tiger Roaring Sound is recorded in a place where tigers inhabitate with portable recorder and is used as a effect sound. However, in early broadcasting period when sound picking was not easy tiger Tiger Roaring Sound has to be made artificially. For comparative analysis of Actual and Foley Tiger Roaring Sound of tiger this research analyzes production principle and usage of Foley sound tools. It has proved similarity and studied creativity and exclusivity of Actual and Foley sounds through their comparative analysis. As Foley sound of Tiger Roaring Sound is very unique and interesting, it is worth developing it into cultural contents related to performance, exhibition, and experience.

Keywords: early broadcasting stations, radio drama, actual sound, Foley sound, tiger roaring sound, sound contents

1. Introduction

As tigers are very fierce nocturnal carnivorous animal moving around forest areas with full of trees its Tiger Roaring Sound is used to imply deep forest or scary scene. In recent drama, it is used as a background sound of zoo scene or in drama based on tiger. Also, in fairy tale audio book and animation for children, tigers often appear in a satirical way so that tiger Tiger Roaring Sound is required. Today, for sound recording, one directly goes to tiger habitat or zoo with portable digital recorder and use it in media. However, during early broadcasting period when the environment was so poor, not only tiger Tiger Roaring Sound but also other sounds had to be imitated with tools. As these tools are so unique and interesting they can be turned into cultural contents such as performance or exhibition contents or creativity educational contents. This research has verified value of using Foley sound of Tiger Roaring

Sound and its tools as cultural contents by confirming degree of similarity and preference based on comparison and analysis of Actual and Foley sounds.

2. Experiment on instruments producing Foley sound of Tiger Roaring Sound

A research on appetite stimulation through auditory sense is performed by awakening human's sense center in connection with food experience to trigger its association process by the mediation of hearing sense. The characteristics of Tiger Roaring Sound is that strong low frequency sound is generated from thick neck and healthy vocal tract and cord. Especially, this strong low frequency sound of Tiger Roaring Sound is the exclusive vocalization of tiger producing not only the low frequency sound in audible frequency range of human but also ultra low frequency sound out of audible frequency range.

2.1. Making of Tiger Roaring Foley Sound

No matter the types of Foley sound, features of Actual sound to be described have to be analyzed in detail to make the necessary Foley sound. Tigers have long and big body, thick neck, big and wide tongue, and sharp teeth. Also, as a predator, it has strong and flexible muscles as well as healthy lung with a large capacity. These structure and features of its body are parts of factors creating charismatic Tiger Roaring Sound. The unique Tiger Roaring Sound is made from resonance of thick and strong vocal tract and vibration sound from thick and rough vocal cord combining with its big oral structure and tongue. This sound is based on harmony of resonance and vibration meaning that it is necessary to have sound box creating resonance as well as big vocal tract and healthy vocal cord making vibration. In application to this principle, a jar is prepared in replacement to vibration tube for making resonance and instead of vocal cord creating vibration a washboard is prepared. Depending on its size, jar is a useful tool for making a large resonance. Along with deep bumps on washboard if it is rubbed against the jar mouth, one can imitate sound made from vocal vibration of tiger.



Fig 1. Categorizing Foley Instruments to Reproduce Sound of Tiger Roaring Sound

As you can see in Figure 1, jar plays a similar role to that of vibration tube which is like the lung and vocal tract of tiger and makes resonance. The washboard is like the big and strong vocal cord of tiger. Size of jar determines degree of resonance and number of bumps on washboard distinguishes features of tone and bandwidth made from vibration sound of vocal cord.

2.2. The use Foley sound instruments for Tiger Roaring Sound

In terms of utilizing Foley sound tools for making Tiger Roaring Sound, based on its rhythm, melody, and repetition, number of bumps on washboard and its magnitude of friction with the jar is determined. It should be played by changing sound strength along with constant degree of resonance.



b. Foley Sound of Tiger Roaring Sound

Fig. 3. Comparison between the two sounds

E1(n) is the change of energy of the actual recorded file and E2(n) is the value of energy. The following equation measures the similarities of each frequency.

In Figure 3 of time scope analysis on Tiger Roaring Sound , Actual Tiger Roaring Sound starts with a loud phonation for the first one second along with a clear formant. Another characteristics is that it finishes with another loud phonation after 2 seconds.

3-2. Analysis of Frequency Range

Spectrum analysis was done to compare the properties of natural and foley sounds of Tiger Roaring Sound by frequency bandwidth. The concept of FFT was used to understand and obtain result of the properties of wave analysis by frequency.

$$D_{LS} = \sqrt{\frac{1}{2\pi} \int_{-\pi}^{\pi} [10 \log_{10} \frac{P(\omega)}{\hat{P}(\omega)}]^2 d\omega} \quad (2)$$

We set the change of Actual sounds’ frequency as FE1(n) and the changes in the Foley sound of FFT as the value of FE2(n) and input them into the following equation to find out the similarities.

$$D_{LS} = \sqrt{\frac{1}{2\pi} \int_{-\pi}^{\pi} [10 \log_{10} \frac{P(\omega)}{\hat{P}(\omega)}]^2 d\omega} \quad (3)$$

$P(\omega)$: Actual Signal, $\hat{P}(\omega)$: Created Signal

The above equation measures spectral distance using log-spectral distance.

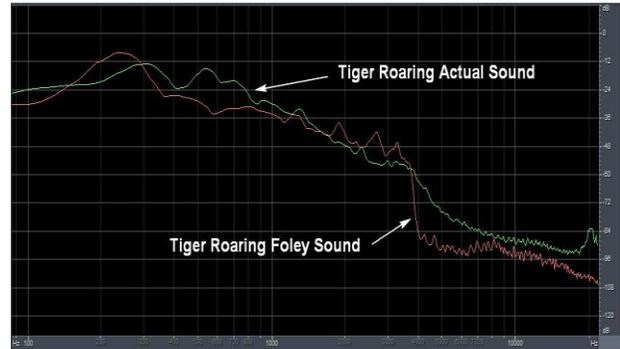
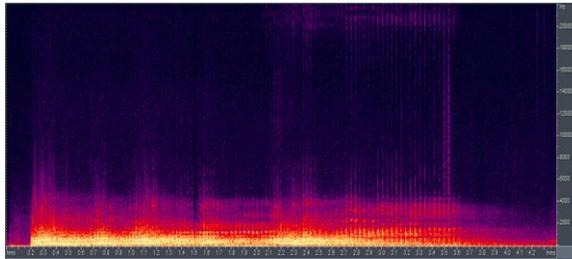


Figure. 4. Comparison of the average spectrum of Tiger Roaring Sound

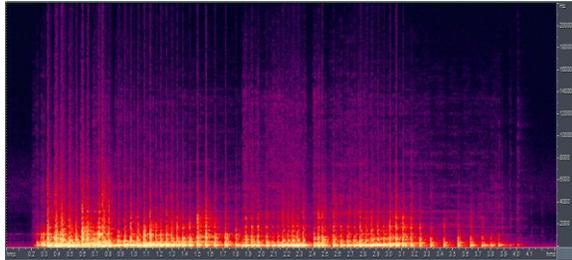
Looking at the graph showing comparative analysis of frequency through spectrum of Actual and Tiger Roaring sound in Figure 4, the two sounds have almost the same frequency range and thus, it was proven that they have similar features in general. However, Actual Tiger Roaring sound has all four formant factors under 1,000Hz but Foley sound had hi resonance frequency peaks with a wide bandwidth, that is, the highest resonance frequency between 200Hz to 300Hz. Also, it is showing small peak points sporadically spread at high frequency part of over 1,000Hz. In overall frequency graph, they look similar but there is a difference in formation position, size, and number of formant and extent of bandwidth. As a analysis result, Tiger Roaring Sound is expressed in all low frequency range under 1,000Hz and as it moves to high frequency range, energy weakens. It was turned out that Foley sound has similar patterns with Actual sound.

3-3. Spectrogram Analysis

This research tries to verify similarity between sound quality and volume of each sound to be compared by examining components expressed by sound through spectrogram analysis of Actual and Foley sounds.



a. Actual Sound of Tiger Roaring Sound



b. Foley sound of Tiger Roaring Sound

Figure 5. Comparison between the two spectrogram of Tiger Roaring Sound

Spectrogram in Figure 5 shows concentration and bandwidth of volume by range of frequency. Both Actual and Foley Tiger Roaring Sound had strong energy in all low frequency ranges and create weak energy in high frequency range. It was found out that Foley sound had highly similar pattern with the Actual sound. Foley sound had relatively stronger energy formation in high frequency range compared to the Actual sound. This can be seen as the result of intentional action and willingness applied to imitate the Actual sound.

3-4. Mean opinion score test

Mean Opinion Score (MOS) test was used as a verification tool for increasing reliability of previous various analysis and comparison based on reaction of 5 listeners who heard both Actual and Foley Tiger Roaring Sound. For MOS test method, both Actual and Foley sounds were played to listeners and asked them to score on their similarity and preference.

Similarity score is for selecting a sound that has more realistic tendency and preference score

Sound category	A	B	C	D	E
Actual Sound	4.9/4.8	4.7/4.6	4.5/4.3	4.6/4.6	4.8/4.7
Foley Sound	4.2/4.5	4.3/4.4	4.0/4.2	4.2/4.0	4.3/4.5

shows its preference to be used as a sound effect. For calculation, the highest score for each similarity and preference was set to be 5.

Table 1. MOS test table of Foley Tiger Roaring Sound

High Score: 5point

First of all, listener A has given 4.9 points on similarity after hearing the Actual sound and 4.8, a relatively high score for appropriateness of it to be used effectively. When Foley sound is played A has given 4.2, meaning it is very similar to the Actual sound but still, lacks in similarity with the Actual sound. However, A has scored 4.5, a good score showing it is preferred to be used effectively. For other listeners, they were well aware of the Actual Tiger Roaring Sound and their preference score, testing appropriateness of being used as sound effect was over 4.5. When Foley sound was played, they well-recognized it and had a good understanding on its similarity with Actual sound. There was a little difference between each listener but in general, they had the same reaction.

5. Conclusion

In this research, it has studied on characteristics, similarity, and preference of Foley sound tools used to describe Tiger Roaring Sound more effectively in scenes of tiger appearance in broadcasting or movie. Conclusion drawn from this research will be applied to creating cultural contents using Foley Tiger Roaring Sound such

as performance, exhibition and experience, and creative education. Research on Foley Tiger Roaring Sound was done by having comparative analysis of Actual and Foley sounds. For this research, samples of Actual Roaring Sound of traditional Korean tiger collected from data are prepared and Foley sound recorded from jar and washboard is prepared. This prepared samples went through analysis of time scope, frequency, spectrogram, energy, and MOS to identify characteristics, similarity, and preference of Actual and Foley sounds. As a result, Foley sound had an excellent imitation of Actual sound in terms of bandwidth and tone, degree of resonance, and frequency range. Especially, it had highly similar pattern of its unique phonation in low frequency range. Like this, production principle and use method of Foley sound and its tools for imitating Actual Tiger Roaring Sound are so unique and interesting that they are good enough to draw attention from audiences. Thus, research conclusion is that they have high potential to be developed as excellent cultural contents for exhibition, experience, and performance.

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