

Original Article

# A Study on Foley Sound for Producing Tigers Roar Sound

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**Abstract** - Tigers are at the top of the food chain among felines. Their roaring sounds have long been used frequently in Movie and broadcast production. In the early days of broadcasting, there were no portable recorders, so tiger roars had to be made using tools in the studio. This process of making sounds needed for movies or broadcasts using tools is called Foley sound. These Foley sounds were gradually replaced by recorded real sounds as portable recorders were introduced. Many unique and interesting Foley sounds were used in the early days of broadcasting, but they have gradually disappeared, and only a few remain now. Among them, this paper aims to study and restore the tools and methods related to the production of Tiger Roar Foley Sound. For the study, we compared and verified the Actual Tiger Roar Sound and the Tiger Roar Foley Sound using the tool. The reason for researching and restoring the disappearing Foley Sound is to secure the possibility of using Foley Sound, which contains the history of broadcasting technology and the meaning of data preservation, for various contents. The research results confirmed that the Tiger Roar Foley Sound is very similar to the Actual Tiger Roar Sound and that the tools used to make the sound and the method used are unique and interesting, making them worth preserving. Various Foley Sounds have already been used in exhibition content, experience content, performance content, etc. In the future, it is necessary to discover and reproduce more Foley Sounds and utilize them in various contents.

**Keywords** - Tiger roar foley sound, Portable recorder, Movie, Broadcasting, Foley sound, Actual tiger roar sound.

## 1. Introduction

Tiger Roar Sound has been used frequently in movies and broadcasts for a long time as a symbolic sound or realistic sound. Tigers are very ferocious nocturnal carnivores that are mainly active at night in dense forest areas, so they are used to express deep forest scenes or fear. Sometimes, Tiger Roar Sound is also used as a friendly and fun animal cry in programs aimed at children. Also, Tigers often appear satirically in children's favorite fairy tale audiobooks and animations, so Tiger Roar Sound is often used. Currently, when Tiger Roar Sound is used in broadcasts or movies, portable digital recorders are used to record in habitats or zoos, or foreign records are imported and used. However, in the early days of broadcasting, portable recorders did not exist, so Tiger Roar Sound had to be used as a tool to create Foley Sound. In this paper, we compare and verify the Actual Tiger Roar Sound and Tiger Roar Foley Sound. The reason for comparing and verifying actual Tiger Roar Sound and Tiger Roar Foley Sound is to verify whether Tiger Roar Foley Sound can be utilized in various content. Currently excavated Foley Sounds include sounds of rain, thunder, wind, waves, snow stepping, leaves stepping on, birds, frogs croaking, and horse hooves, and are being used as broadcasting production or performance content. These Foley Sounds are popular because

their tools and methods of using them are unique and interesting, and they have great value for utilizing as materials for more content. As discovered to date, Foley Sounds are being used not only in broadcasting but also as exhibition content, experiential content, and performance content in the modern media field.

From that perspective, There is great potential for utilizing Tiger Roar Foley Sound as performance, exhibition experience, and educational content to enhance Actual Tiger Roar Sound was used to compare and verify Tiger Roar Foley Sound with Actual Tiger Roar Sound, which was Actual Tiger Roar Sound used as broadcasting material by broadcasting stations. Tiger Roar Foley Sound was collected by reproducing the method of making tiger roars in the early days of broadcasting through historical research. The equipment for collecting Tiger Roar Foley Sound was the H2 digital recorder from ZOOM. Tiger Roar Foley Sound was recorded in a broadcasting station studio for broadcast production in order to achieve high-quality recording. The method for comparing Actual Tiger Roar Sound and Tiger Roar Foley Sound was conducted through acoustic analysis and a simple opinion poll, the MOS Test. The acoustic analysis was performed using Adobe's Audition program to perform time domain analysis,



frequency analysis, and spectrogram analysis. In the MOS Test, a simple survey, 50 listeners listened to the actual Tiger Roar Sound and Tiger Roar Foley Sound to determine the similarity. The reason for conducting the MOS Test was to increase the reliability of the study and to thoroughly verify the Tiger Roar Foley Sound.

## **2. Study of Tiger Roar Foley Sound**

Tigers are top predators, hunting elephants and giraffes, as well as hippos, rhinoceroses, and buffaloes, which are larger than themselves. They also consider all animals as prey, including cats like themselves, leopards, pumas, and cheetahs, as well as hyenas, wolves, zebras, and jackals. Accordingly, the Tiger Roar Sound strikes fear into all animals. The Tiger Roar Sound uses its thick neck and the strong vocal cords and vocal tract in the back of its head to produce a loud roar.

In particular, the unique vocalization principle of tigers generates not only low-frequency sounds within the audible frequency range of humans but also ultra-low-frequency sounds beyond the audible frequency range of humans. This principle is that the air inhaled into the tiger's lungs resonates in the thick and strong vocal tract, shaking the strong vocal cords and producing the tiger's unique roaring sound with its large mouth and tongue. The Foley Sound Tools for imitating the tiger roar sound were studied by referring to the body structure and movements of tigers for vocalization. These Foley Sound techniques were gradually replaced by field recordings and studio recordings as recording technology developed. [1]

### **2.1. What is Foley Sound?**

Foley-Sound is a term created in the 1920s, when Hollywood was transitioning from the silent film era to the talkie era, by the sound artist Jack Donovan Foley (1891-1967), who began adding sounds to movies for the purpose of props. In other words, to define it in one word, it can be said to be a method of sound utilization where various sounds were created using props and used in movies and broadcasts before portable recorders were used. Portable recorders became popular in the 1950s, and after that, when sound recording activities began, various sounds were recorded and used in broadcasts and movies. As portable recorders became popular, people could carry them around and record various sounds, and Foley Sound gradually began to decrease.

In the early days of broadcasting, before portable recorders were introduced, various sounds, not just tiger roar sounds, had to be created using tools. Such Foley Sounds were unique and interesting in terms of the tools and methods of use for each sound. Now, many unique and groundbreaking Foley Sounds have disappeared, but the disappearing Foley Sounds can be discovered and reproduced to sublimate them into various content such as performances, exhibition experience content, and creative education content. Among them, this paper studied the possibility of utilizing Tiger Roar Foley

Sound as various contents by comparing them with Actual Tiger Roar Sound. [2][3]

### **2.2. Research by Tiger Roar Foley Sound Tools**

Any Foley Sound should be imitated by closely analyzing the characteristics of the Actual Sound and then selecting tools and studying how to handle them. The Tiger Roar Foley Sound studied in this paper also requires a close analysis of the characteristics of the Actual Tiger Roar Sound, preparing tools appropriate for it, and studying how to use them. From that perspective, tigers have a large body that matches their roar, a long and thick neck, a large and wide tongue, and a large mouth with sharp teeth. They also have strong and flexible muscles as a predator and large-capacity lungs that facilitate strong and loud vocalization. This body structure and characteristics can produce a roar that allows you to feel the charisma of a tiger. The Tiger Roar Sound is a sound that is unique to tigers, created by the resonance characteristics of the thick and strong vocal tract and the vibration of the thick and rough vocal cords, which are fused together by the large oral structure and tongue. In a word, the sound is structured so that the vibration generated through the large neck and strong vocal cords can produce a loud resonance. In other words, a sound box that matches the size of the tiger's neck and a tool that can replace the strong vocal cords that induce the vibration are needed. Applying this principle, a jar ware of an appropriate size was prepared as a sound box for resonance, and a washboard was prepared as a vocal cord for vibration.

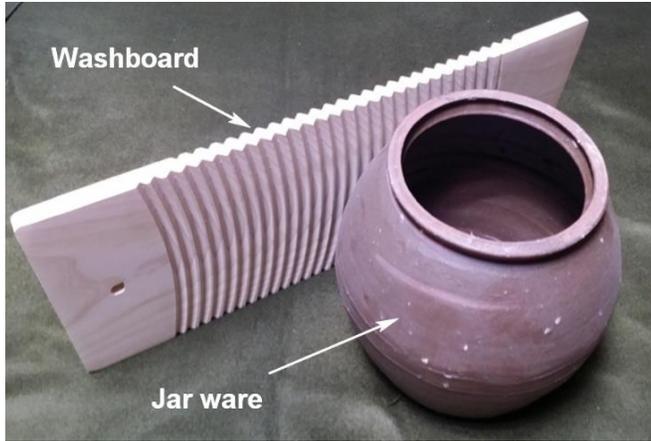
The jar ware is a useful tool that induces a large resonance depending on its size, and the washboard has large protrusions, so it can be an excellent tool for imitating the Tiger Roar Foley Sound. Figure 1a shows Jar Ware and Washboard, which are tools for making Tiger Roar Foley Sound. Jar Ware, which can be seen in Figure 1a, is a traditional Korean jar called 'Dok' or 'Jangdok' in Korean and is a highly breathable jar used for storing soy sauce, soybean paste, and kimchi. The size of the jar, as shown in Figure 1b, is similar to the size of the neck and neck circumference of a tiger's body, and a jar and washboard were prepared. The prepared jar acts as a sound box that acts as the tiger's lungs and vocal tract and generates an appropriate resonance phenomenon. The prepared washboard acts as the tiger's large and strong vocal cords. The size of the jar determines the degree of resonance, and the several protrusions carved into the washboard act as the tiger's vocal cords. The jar and the washboard will rub against each other and create a resonant sound, imitating the timbre, amplitude, and volume characteristics of the Actual Tiger Roar Sound, creating the Tiger Roar Foley Sound.[4]

### **2.3. How to Use the Tiger Roar Foley Sound Tools**

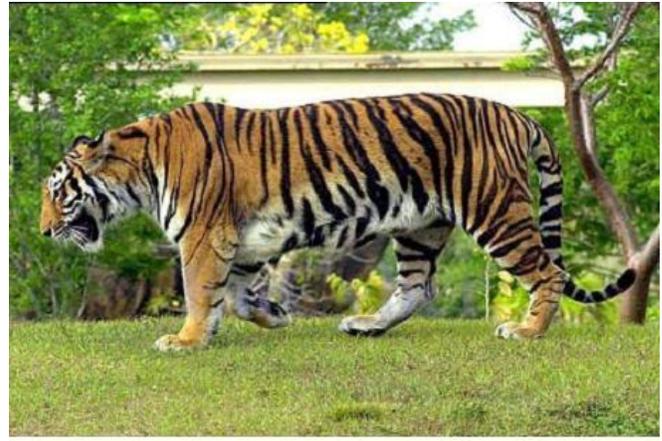
The method of using Tiger Roar Foley Sound Tools should be to imitate the characteristics of the Actual Tiger Roar Sound so that they can be well described. Based on the rhythm, pitch, and repetition of the Actual Tiger Roar Sound,

the friction width between the protrusions of the washboard and the jar should be determined, and the degree of resonance should be maintained to adjust the intensity of the volume to express it realistically. In order to create Tiger Roar Foley Sound, the Actual Tiger Roar Sound must be analyzed and

imitated well. From that perspective, the actual tiger roar is divided into a roaring sound, a warning sound, and an attacking sound. The tools used to create Tiger Roar Foley Sound are a jar the size of a tiger's neck and a washboard to create friction sounds.



a. Tiger roar foley sound tools

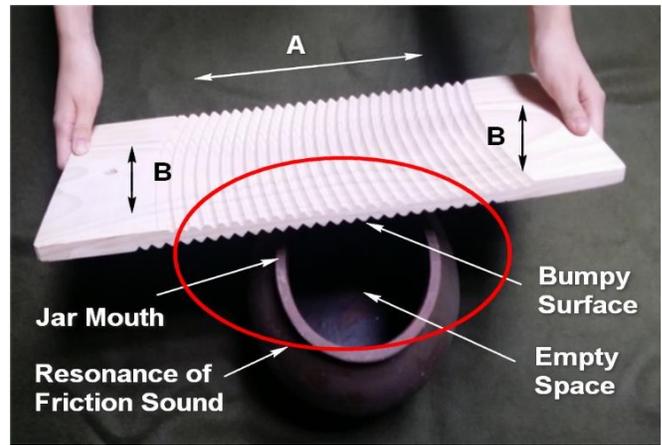


b. Tiger's physique and structure

Fig 1. Tiger roar foley sound tools



a. Roaring tiger's face



b. Making tiger roar foley sound

Fig 2. How to use the tiger roar foley sound tools

To put it in more detail, hold the protrusions of the washboard horizontally toward the entrance of the jar, place it against the entrance of the jar, and create friction while thinking of the Actual Tiger Roar Sound to create sound. It can imitate the Tiger Roar Foley Sound. The principle of Tiger Roar Foley Sound is that the air inhaled into the tiger's lungs is strongly pushed up, causing friction and resonance in the tiger's thick and strong vocal cords, and the tiger's unique roar is generated through the tiger's large mouth and tongue. Figure 2a is the face of a tiger roaring.

The Actual Tiger Roar Sound is a sound that comes up from the tiger's thick neck, vibrating the vocal cords, and vibrates through the tiger's large head and oral cavity, and is resonated by the technique of the hyoid bone. A jar and a washboard are used to imitate this actual Tiger Roar Sound, as

shown in Figure 2b, to create the Tiger Roar Foley Sound. Here's how to make a Tiger Roar Foley Sound: As shown in Figure 2b, move the protruding part of the washboard at the entrance of the jar left and right like A and up and down like B to create friction, imitating the sound of a tiger roaring. Simply put, place the jar on the floor and hold the washboard horizontally with both hands, as if covering the jar, tilt it at a 45-degree angle, and create friction left and right. The speed and intensity of the friction between the jar and the washboard allow you to describe the tiger roaring by changing it to be strong or weak, fast or slow. Also, various rubbing techniques can express the tiger roaring in various ways. The jar's inner space amplifies the friction with the washboard at the entrance of the jar, causing resonance, which can well imitate the low-frequency characteristics of the Actual Tiger Roar Sound. The loud roar of a tiger is created by rubbing a washboard against

the mouth of a jar quickly and forcefully. The growling sound of a tiger, as in a warning, is created by rubbing a washboard against the mouth of a jar slowly and forcefully. The jaw-snapping sound of a tiger, as in an attack, is created by placing a washboard against the mouth of a jar in short, rapid, and irregular bursts. Tiger Roar Foley Sound Tools use jars and washboards, and the method of handling them can be called Foley Sound Tools, which can imitate the unique tone, range, and volume of the Actual Tiger Roar Sound as much as possible. [5]

### 3. Analysis and Verification of Tiger Roar Foley Sound

As the top predator among carnivores, Tiger Roar Sound is a sound with a unique frequency and energy that is alive. The characteristics of the Tiger Roar Sound are generated by the principle of amplifying the vibration of the tiger's unique vocal cords into a loud resonance phenomenon. It also has the sound characteristic of irregularly generating strong low-frequency and ultra-low-frequency energy. In order to analyze and compare Tiger Roar Foley Sound and Actual Tiger Roar Sound, respectively, Actual Tiger Roar Sound and Tiger Roar Foley Sound were prepared. Actual Tiger Roar Sound was prepared using a tiger roar with verified sound quality used as sound effect material in broadcasting stations. Tiger Roar Foley Sound was recorded using prepared Tiger Roar Foley Sound Tools, such as a jar and a washboard.

The recording of Tiger Roar Foley Sound was prepared by recording in a broadcasting station drama production studio with perfect soundproofing equipment to ensure high-quality sound. In order to analyze and verify Tiger Roar Foley Sound, acoustic analysis and MOS Test analysis were performed, and a simple questionnaire was administered.

For the acoustic analysis of Tiger Roar Foley Sound, the actual Tiger Roar Sound and Tiger Roar Foley Sound were analyzed in the Time Domain, Spectrum Analysis, and Spectrogram Analysis, respectively. Through the Time Domain, the similarity in the tone and amplitude of Tiger Roar Sound was identified, and through Spectrum Analysis, the distribution and changes in the frequency of the sound were identified, and through Spectrogram Analysis, the energy of the sound quality and volume was compared.

For scientific sound wave analysis, time domain analysis was performed to analyze the sound waves of Tiger Roaring sounds over time, spectrogram analysis was performed to analyze sound energy, and spectrum analysis was performed to compare the pitch of each sound frequency band. For this scientific analysis, Adobe's Audition 3.0 program was used. Frequency component analysis uses the FFT concept. In order to verify the similarity between the Actual Tiger Roar Sound and the Tiger Roar Foley Sound, a simple questionnaire, the MOS Test, was performed.[6][7]

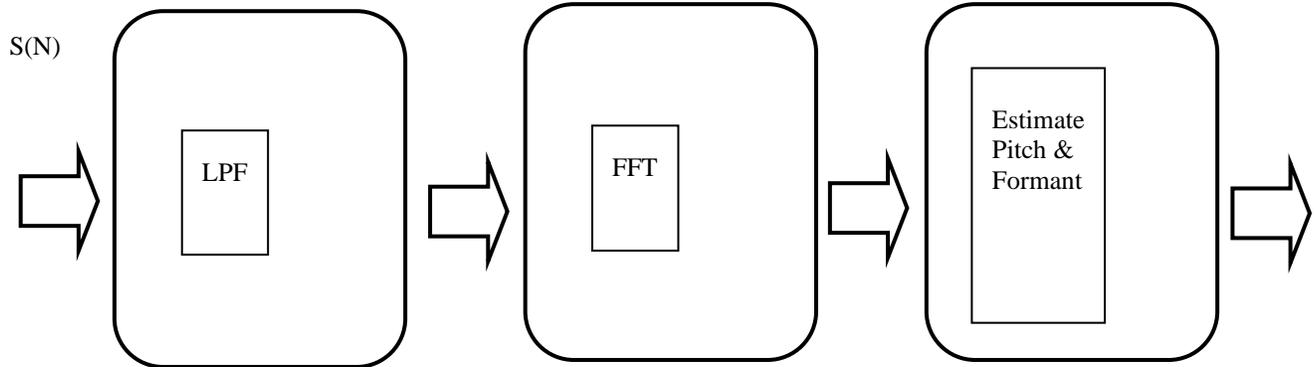


Fig 3. FFT diagram for obtaining sound information

Figure 3 above is a diagram showing the process of digitizing the analog sound signal of the Tiger Roaring Sound using the Fast Fourier Transform (FFT). The first step in digitizing the analog signal is to perform a low-pass filtering operation (LPF: Low Pass Filter) that passes the low-frequency signal while filtering out the noise that exists in high frequencies. Next, the sound signal is converted to be easy to analyze using the Fast Fourier Transform. Through this process, a foundation for analyzing the pitch and formant of the sound frequency is established.

#### 3.1. Time Domain Analysis

In order to analyze and compare the similarity in timbre and amplitude of Actual Tiger Roar Sound and Tiger Roar

Foley Sound, time domain analysis was performed. Time domain analysis of Actual Tiger Roar Sound and Tiger Roar Foley Sound can distinguish their unique timbres through waveforms. In addition, the vocalization characteristics can be compared through changes in the unique sound forms of Actual Tiger Roar Sound and Tiger Roar Foley Sound according to waveform changes over time. In order to prove the similarity between Actual Tiger Roar Sound and Tiger Roar Foley Sound, waveform analysis was performed to compare and analyze time domain components, and the results were obtained. In order to prove the similarities between the Actual Tiger Roar Sound and that of the Foley one, energy properties against the time frame and the wave patterns were compared.

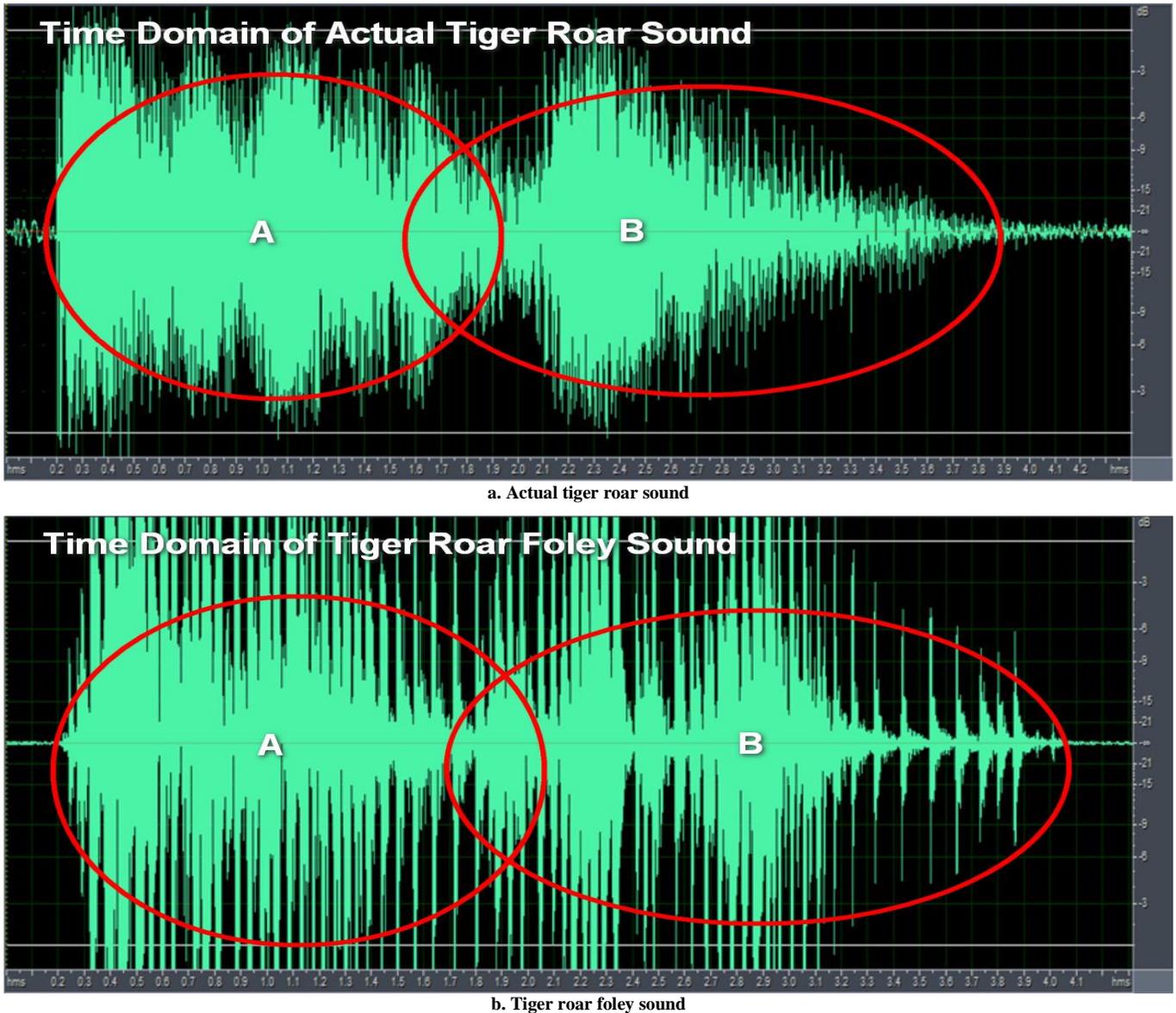


Fig 4. Comparative analysis of the time domain of actual sound and foley sound of the tiger roar sound

Figure 4 compares the Time-Domain graph of the Actual Tiger Roar Sound in a and the Time-Domain graph of the Tiger Roar Foley Sound in b. A and B in each graph distinguish between the first and second vocalizations. When comparing the Time-Domain graph of the Actual Tiger Roar Sound in a and the Time-Domain graph of the Tiger Roar Foley Sound in b, the overall graphs of areas A and B are similar, but the density of the waveforms in areas A and B of the Actual Tiger Roar Sound Time-Domain graph is slightly denser and more natural. The Time-Domain graph of Tiger Roar Foley Sound in b has less dense waveforms than the Time-Domain graph of Actual Tiger Roar Sound in a, but overall, areas A and B show similar waveforms. This phenomenon is a natural waveform form that real sounds show. Tiger Roar Foley Sound expresses that it is inevitable to generate somewhat awkward waveforms in the process of

artificially moving tools to imitate the Actual Tiger Roar Sound. However, the overall similar waveforms shown in the two Time domain graphs a and b in Figure 4 explain that the Tiger Roar Foley Sound depicts the Actual Tiger Roar Sound similarly.[8]

### 3.2. Spectrum Analysis

In order to compare the frequency band characteristics of Actual Tiger Roar Sound and Tiger Roar Foley Sound, the Spectrum graphs were compared and analyzed.

The Spectrum graph can be used to confirm the frequency distribution and changes of sound through waveform analysis for comparative analysis of Actual Tiger Roar Sound and Tiger Roar Foley Sound and to compare them with each other.

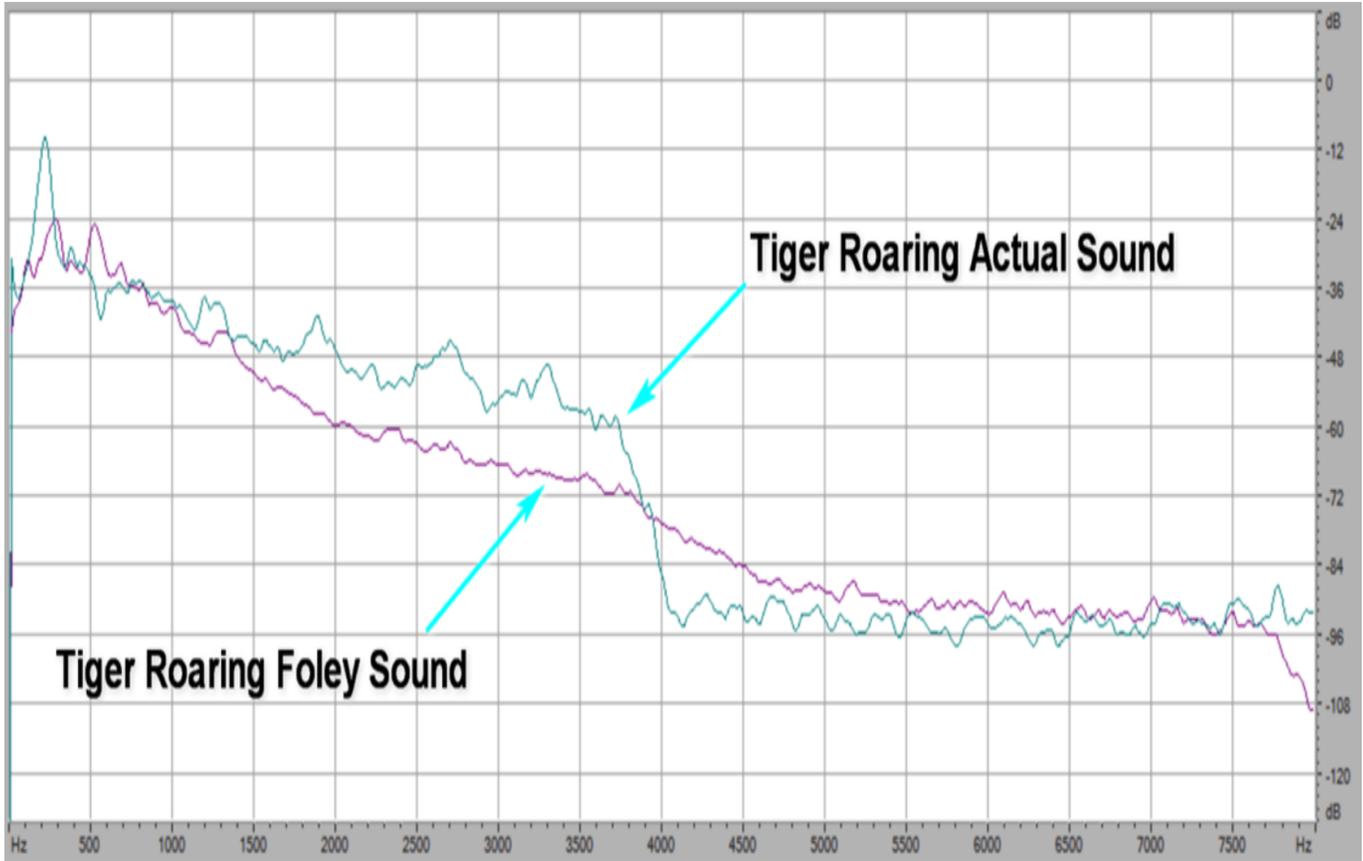


Fig 5. Comparison of spectrum graphs of actual sound and foley sound of the tiger roar sound

The Spectrum graph is utilized to analyze the components of the frequency domain using the FFT concept and obtain the result values to identify the frequency characteristics of the vocalization sound through the tiger's vocal tract and glottis. The frequency-specific distribution and change of each frequency component of the Actual Tiger Roar Sound and the Tiger Roar Foley Sound were measured using the following equation. 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 results of the properties of wave analysis by frequency. Figure 5. Comparative frequency analysis graphs of the Spectrum of Actual Tiger Roar Sound and Tiger Roar Foley Sound show that the actual sound and Foley Sound have almost the same frequency band distribution, proving that the two sounds have similar characteristics overall.

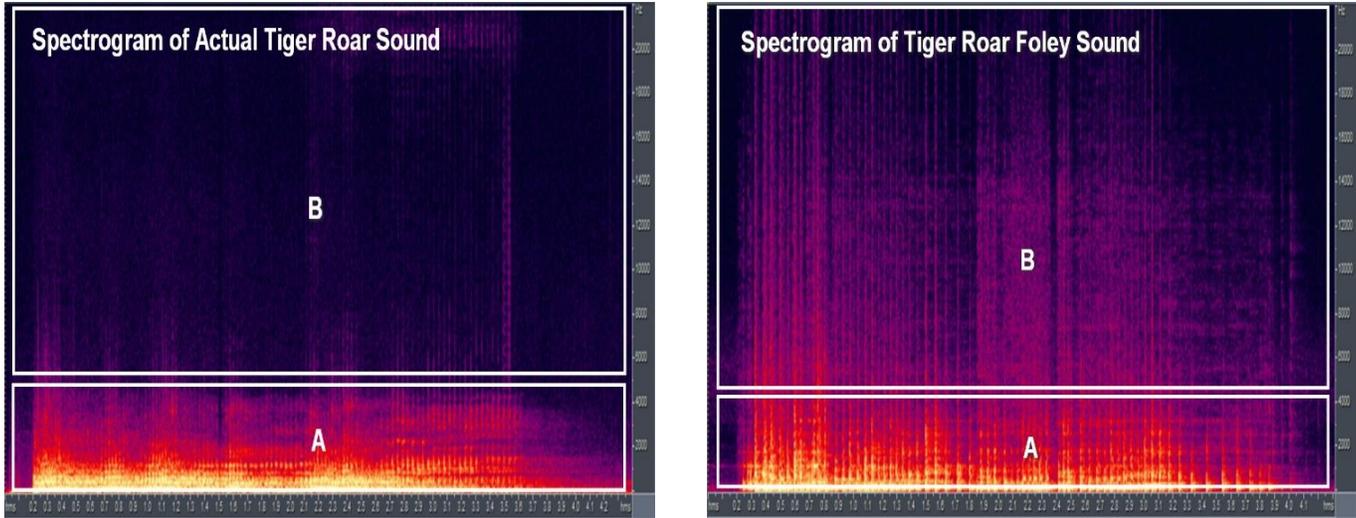
However, while Actual Tiger Roar Sound has all four formant components formed below 1,000 Hz, Tiger Roar Foley Sound prominently shows a high first resonance frequency with a wide bandwidth between 200 Hz and 300 Hz and sporadically shows four small formants in the high-frequency part above 1,000 Hz. The overall frequency graphs are similar, but there are some differences in the formation

location, size, and a number of formats, as well as the width of the bandwidth. The analysis results show that Actual Tiger Roar Sound is expressed entirely in the low-frequency band below 1,000 Hz and that the energy becomes weaker as it goes to the high-frequency band. It can be analyzed that Tiger Roar Foley Sound also imitates these characteristics of Actual Tiger Roar Sound very similarly. As a result, the Tiger Roar Foley Sound shows the efforts to imitate the Actual Tiger Roar Sound through the similarity of the frequency distribution and the change in the resonance frequency peak in each Tiger Roaring Sound.[9]

### 3.3. Spectrogram Analysis

Through Spectrogram analysis of Actual Tiger Roaring Sound and Tiger Roar Foley Sound, we can analyze the frequency-specific energy distribution expressed by each Tiger Roaring Sound more clearly. The Spectrogram graph expresses the sound quality and volume energy of each sound to be compared as the difference in brightness.

The part with strong energy is expressed very brightly, and as the energy gets weaker, it is expressed gradually darker. By comparing the Spectrogram analysis of the Actual Tiger Roar Sound and the Tiger Roar Foley Sound, we can verify the degree to which the Tiger Roar Foley Sound is similar to the Actual Tiger Roar Sound.



a. Spectrogram of the actual tiger roar sound  
b. Spectrogram of the tiger roar foley sound  
Fig 6. Comparative analysis of spectrogram graphs of actual sound and foley sound of the tiger roar sound

The Spectrogram graph in Figure 6 is a graph that represents the sound energy by frequency band of the Actual Tiger Roar Sound and Tiger Roar Foley Sound. a is the Spectrogram graph of the Actual Tiger Roar Sound, and b is the Spectrogram graph of the Tiger Roar Foley Sound. In addition, in the Spectrogram graphs of a and b, the low-frequency range is represented as A, and the relatively high-frequency range is represented as B to compare the two sounds.

If you compare the actual Tiger Roar Sound Spectrogram graph of a and the Tiger Roar Foley Sound Spectrogram graph of b as a whole, you can see the difference between the graphs at a glance. First, if this graph compares the Actual Tiger Roar Sound Spectrogram graph of a and the Tiger Roar Foley Sound Spectrogram graph of b, it can be seen that the low-frequency part of each A part has very similarly distributed energy. However, if it looks at the relative high-frequency area of the B part of each a and b graph, the sound energy of the Actual Tiger Roar Sound Spectrogram graph and the Tiger Roar Foley Sound Spectrogram graph are different. In each of the a and b graphs, the sound energy of the B part is expressed weakly in the graph, and the b graph, it is expressed as several vertical lines, and the sound energy is expressed strongly. The reason why parts A are similar is that the jar was a very appropriate tool for creating the low-frequency sound characteristic of a tiger's roar among the tools for creating the Tiger Roar Foley Sound. The reason why parts B are different is that the sound is expressed with strong energy because the protrusion of the washboard among the tools for creating the Tiger R

oar Foley Sound rubs against the mouth of the jar more strongly. However, suppose you actually listen to the Tiger Roar Foley Sound. In that case, you can see that it actually creates a sound that better represents the characteristics of the Actual Tiger Roar Sound.[10]

### 3.4. Verification of Tiger Roar Foley Sound through MOS Test

The MOS (Mean Opinion Score) Test is a short-form survey-type test that surveys opinions on a small scale. In this paper, the MOS Test was conducted as a method to verify the similarity between Actual Tiger Roar Sound and Tiger Roar Foley Sound. In order to conduct the MOS Test, 50 listeners were selected to listen to Actual Tiger Roar Sound and Tiger Roar Foley Sound and give their opinions. The MOS Test was conducted by having 50 listeners listen to the Actual Tiger Roar Sound and the Tiger Roar Foley Sound, and evaluating the similarity score and usability score of the Tiger Roar Foley Sound to the Actual Tiger Roar Sound. The similarity score is a way to check how similar the Actual Tiger Roar Sound and the Tiger Roar Foley Sound are to each other.

The usability score is a score that determines whether the Tiger Roar Foley Sound is worth using in various contents. The similarity score and usability score are each evaluated based on a 5-point scale. The results obtained through the responses of the 50 listeners are also used as a means to increase the reliability of the various acoustic comparison and analysis results conducted above.

Table 1. MOS test table of tiger roar foley sound

Sounds Listeners	Actual Sound& Foley Sound		Sounds Listeners	Actual Sound& Foley Sound	
	Similarity Score	Usability Score		Similarity Score	Usability Score
Listener 1	4	5	Listener 26	4	5
Listener 2	5	4	Listener 27	4	5
Listener 3	4	4	Listener 28	5	5

Listener 4	4	5	Listener 29	4	5
Listener 5	3	5	Listener 30	3	4
Listener 6	5	5	Listener 31	4	5
Listener 7	4	4	Listener 32	4	5
Listener 8	3	3	Listener 33	5	5
Listener 9	4	5	Listener 34	3	4
Listener 10	4	5	Listener 35	3	5
Listener 11	3	5	Listener 36	4	4
Listener 12	4	4	Listener 37	4	5
Listener 13	5	4	Listener 38	5	5
Listener 14	4	5	Listener 39	5	5
Listener 15	5	5	Listener 40	5	5
Listener 16	4	5	Listener 41	4	4
Listener 17	4	4	Listener 42	4	5
Listener 18	3	5	Listener 43	3	3
Listener 19	4	4	Listener 44	4	5
Listener 20	5	5	Listener 45	5	5
Listener 21	5	5	Listener 46	3	5
Listener 22	4	5	Listener 47	3	4
Listener 23	4	4	Listener 48	4	5
Listener 24	4	5	Listener 49	5	5
Listener 25	5	5	Listener 50	4	5
Total/ Average	Similarity Score	204 / 4.08	Usability Score	233 / 4.66	

Highest score: 5 points each for similarity score and usability score, by score: (Total/Average)

Looking at the MOS Test table of Tiger Roar Foley Sound in Table 1, 50 listeners gave positive scores to Tiger Roar Foley Sound, meaning that it closely imitates Actual Tiger Roar Sound and can be used in various contents. In the similarity score, 10 listeners gave it the lowest score of 3, 26 gave it 4, and 14 gave it the full score of 5. The positive results are that the lowest score is the middle score of 3, that there were the most listeners who gave it a higher score of 4, and that there were 14 listeners who gave it the full score of 5. Therefore, the similarity score was 204 points in total, and the average score was 4.08, which is a high score. This score means that Tiger Roar Foley Sound sounds very similar to an actual tiger roar. Of course, the listeners who gave it a perfect score of 5 did not give it a score because the Tiger Roar Foley Sound was exactly the same as the Actual Tiger Roar Sound.

When it interviewed listeners who gave perfect scores about why they gave them perfect scores, they said that the Tiger Roar Foley Sound was similar to the Actual Tiger Roar Sound but that the similar sounds were novel and interesting, so they deserved full scores. In the usability score, the lowest score was 3 points, which was given by 2 people. There were 13 listeners who gave 4 points and 35 who gave a full score of 5 points. If you add the positive scores of 4 and 5, 48 people highly evaluated the possibility that Tiger Roar Foley Sound can be used in various fields. The total usability score of Tiger Roar Foley Sound was 223 points, and the average score was 4.66 points, which was very high. The reason is that the listeners evaluated that the tools of Tiger Roar Foley Sound

and their sounds are fun and the way to handle them is interesting, so they highly evaluated the possibility of using them as performance or exhibition experience content.[11][12]

#### 4. Conclusion

Many world-class inventions were born in the late 1800s and early 1900s. Among them, Edison's invention of the phonograph in 1895 brought an end to the silent film era and ushered in the sound film era. In addition, the invention of the phonograph and the development of wireless communication created a new medium called broadcasting in 1920, which led to the creation of the new word "broadcasting," meaning "to make widely known." The era of sound films and broadcast media required a variety of sounds, but the early recorders used in movies and broadcasts were too large to carry around, and their performance was poor.

It was necessary to move around and record various sounds required for movies and broadcasts, but other methods were needed since portable recorders had not yet been developed. So, in the Hollywood film industry, Jack Donovan Foley (1891-1967) created sound films using tools to create various sounds required for movies. Since then, the program was created by making sounds using tools in broadcasting. From then on, the work of making sounds using tools in movies and broadcasting began to be called Foley Sound, named after Jack Donovan Foley. This paper studied the Tiger Roar Foley Sound used in movies and broadcasting. As a

research method, we looked into tools for imitating Actual Tiger Roar Sound and how to use them, and compared Actual Tiger Roar Sound and Tiger Roar Foley Sound. Research results show that the tools used for Tiger Roar Foley Sound were Washboard and jars. The types and shapes of the tools were simple, but they were very unique and interesting. Also, the process of handling the tools to imitate the Actual Tiger Roar Sound included scientific principles, which are physical phenomena, so it was fun and interesting. The scientific principle applied in the process of imitating the Actual Tiger Roar Sound required friction movement because the washboard had to be rubbed against the mouth of the jar. Next, the phenomenon of resonance was also necessary because the sound generated by the friction between the washboard and the mouth of the jar was to vibrate the space inside the jar. Also, when rubbing the washboard against the mouth of the jar, It should use that skill to rub it while making good use of

the Tiger Roar Sound characteristics to create the Tiger Roar Foley Sound more effectively. In the past, the sound of frogs was created with seashells, the sound of birds was created with various flutes, the sound of stepping on fallen leaves was created with film or recording tapes, the sound of stepping on snow was created with starch powder, the sound of horse hooves was created with wooden bowls, the sound of waves was created with large plywood and beads, the sound of rain was created with beads and cellophane, the sound of thunder was created with tin plates, and the sound of wind was created with wooden frames and tent cloths. These were utilized as various content, such as education, exhibition experience, and performance. The results obtained through this study opened up the possibility of utilizing Tiger Roar Foley Sound for various contents. Various content includes performance content, exhibition and experience content, and creating content for creative education.[13]

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