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A Comparative Analysis of the Sound and Replay of Asian Falls

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Abstract

This paper is a paper that analyzes the sound used by using the waterfall sound as a tool among the acoustic effects used in the early radio dramas of broadcasting. In the early days of broadcasting, when there was no portable recorder for recording, it was a broadcasting environment where sound was made using tools. In order to reproduce the waterfall sound using the tool, the origin principle of the waterfall sound was analyzed. Waterfall sounds are made from the sound of a stream of water falling continuously down from high to low, similar to the sound of rain or shower. The results of the study show that the amount of beads is used by beads, and the amount of beads is more than the rainy sound and shower sound. The sound produced by this method was analyzed by using the acoustic analysis tool, and the similarity and preference were analyzed. This study is meaningful in that it can contribute to the cultural contents area in that it is a creativity study for the development of acoustic contents.

Keywords: Waterfall, reproduce, frequency, reverberation

1. INTRODUCTION

In the early days of broadcasting, when there was no portable recorder, all the sound effects of the broadcast had to be made in the studio. Since then, it has developed gradually, carrying a large recorder or carrying it out in the car, but the choreography activity was very difficult. It was not until a while before the sound quality was poor in outdoor recordings, so it was possible to use the actual sound for broadcasting. I think there were many attempts and trial and error to develop the sound of the waterfall. This paper is a study on the possibility of developing creative work and results that appear in the development process of the sound as sound contents by proving the similarity by researching and analyzing the sound of the waterfall sound. Therefore, in this paper, the general characteristics of the waterfall sound are divided into time and frequency areas, and the actual sound and the sound made are compared. In chapter 2, the characteristics of actual waterfall sound were analyzed in the time and frequency domains. In chapter 3, the characteristics of the waterfall sound were analyzed through the comparison and analysis with the actual sound and the cause was identified. In chapter 4, the conclusion is concluded through the direction of future research.

2. STUDY OF THE SOUND OF FALLS

Waterfall sounds are variously required in acoustic effects. To express this effect, many studies have been conducted and still research is continuing to reproduce sounds that appear differently depending on the width or height. This effect sound uses various tools to make sound using tools. The method of using or recording as a previous tool was not verified but analytical verification was not achieved. The nature of the waterfall sound comes from the irregular drops of numerous water droplets, which are characterized by irregularities and diversity compared to other sounds that have repetitive or unique rhythms. This irregularity is applied to make sound. There are many tools similar to water droplets. It can be found in grain, with the thinnest being narrow rice and rice, beans, or red beans as substitutes, but grains are broken when used for a long time or are dry. So they used large and small beads as substitutes. It may be dropped irregularly from top to bottom to express repetitive drop, but it meets the limit of time continuity because it has to be collected and sprayed again after dropping. By creating a passage back to the idea to overcome the limitations, collecting several beads on a thin plate and raising them again, it can generate frictional sounds such as falling water droplets continuously.

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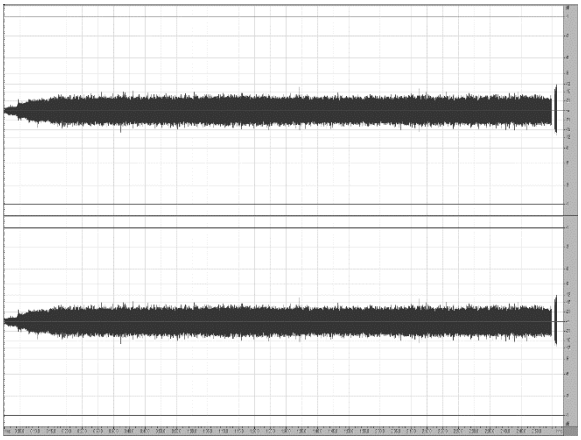
3. COMPARATIVE ANALYSIS OF WATERFALL SOUND

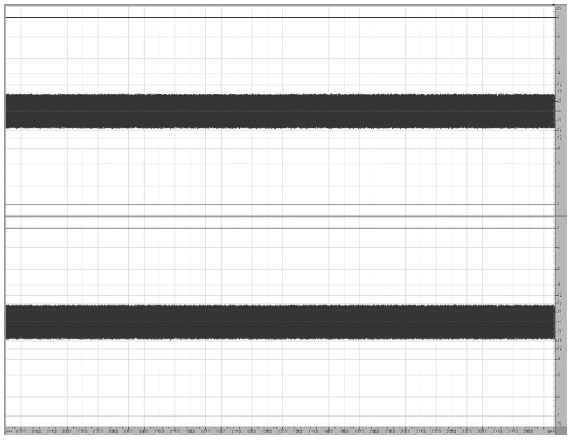
For the comparative analysis of the created waterfall sound and the actual sound, irregularity and continuity are time-domain waveforms, and the overall frequency characteristics are spectrum, and the reverberation sound characteristics and the distribution of the sound by band are analyzed by spectrogram. The result of this analysis is obtained by using FFT concept.

$$C_{fe} = \frac{1}{N}[\sum_{n=1}^{N}(E_1(n) - E_2(n))^2] \quad (1)$$

The difference of each frequency component was analyzed by the above formula and the similarity was measured. The temporal domain waveform was compared to compare and analyze the continuity of irregular sounds, which are the characteristics of waterfall sounds. In the picture, the time domain waveform of the actual sound shows that the sound of the water drops irregularly falling in a wide space is expressed evenly in the whole.



a. Real waterfall waveform



b. waterfall waveform made

Figure 1. Comparative Analysis of Waterfall Sound in Time Area

Figure 1 is a time domain waveform of the created sound, and it is more emphasized in irregularity with the time domain waveform of the actual sound. If this sound is a calm irregularity, the sound made can be seen that the temporal waveform has rough irregularity.

Spectrum analysis is a method to analyze the distribution of all bands such as low frequency, middle frequency and high frequency sound of sound. In this paper, spectrum is used as a method to compare and analyze the actual sound of waterfall sound and the specificity of the created sound by band.

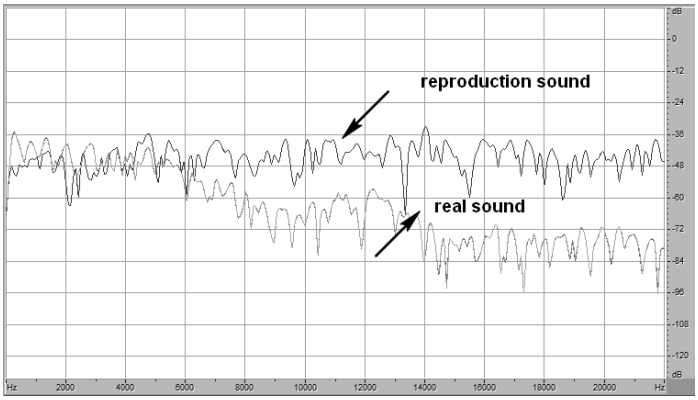


Figure 2. Comparative Spectrum of Falls Sound

As shown in Figure 2, the range of the actual sound of the waterfall is slightly higher in the low and medium ranges, and the range of the sound made in the high range of 10,000 Hz is gradually higher. The reason why there is not much difference in the low-tone band is that the real-tone is natural, so it has a wide scale low-tone band, but the created sound is also irregularly continuous, the Jira low-tone band is maintained sufficiently. In the high-pitched band, the sound is slightly higher, which is caused by exaggerated or irregular force control in the process of artificially dropping the bead. However, the overall sound characteristics and bandwidth distribution are similar, so the similarity between the actual sound and the created sound is high. To analyze the overall compositional distribution of the sound components, the actual sound of the sound and the created sound spectrogram were compared. The spectrogram of the actual sound of figure 3 shows a wide range of strong frequency characteristics in the low-pitched band of 4,000Hz or less. This is a harmonic phenomenon caused by friction with the surface of the water droplet in a wide range in natural space. In addition, white noise, which is clearly distributed to the range of 15,000 Hz, shows the reverberation characteristics of natural sounds.

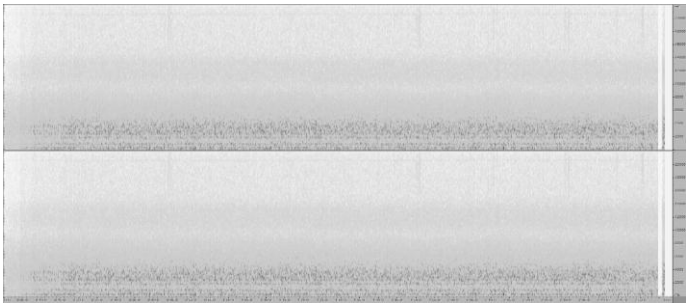


Figure 3. Waterfall Sound Real Sound Spectrogram

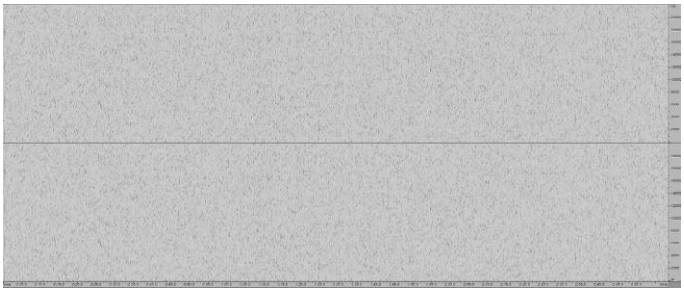


Figure 4. Spectrogram of the Falls Sound

The spectrogram of the sound of Figure 4 shows that the artificial noise resembling natural white noise is expressed evenly or weakly until it reaches the entire band of more than 20,000Hz, as it shows that the various beads were dropped and artificially irregular and strongly shaken. The results of the comparison analysis of the actual sound of the waterfall and the spectrogram of the sound made have a common characteristic of the sound called irregular frictional sound continuity. However, the scale of natural sounds in real sounds is analyzed to have limitations distinguished by artificial expression of sounds made in studios and differentiation from natural reverberation.

In this paper, the sound of the waterfall sound was analyzed to make it ideal. The characteristics of waterfall sound can be classified into various types, but in this paper, it is developed with meaning to play for acoustic effect. The sound was recorded and compared with the actual sound by using the sound made in this way, and the two sounds were analyzed through frequency analysis and comparison, and the characteristics of different waterfall sounds were classified at each height. The experimental results show that the actual sound has a wide range of sound distribution in natural environment and shows even and intense low-pitched energy. On the other hand, the reproduced sound has to be artificially produced in the studio, so it shows unnatural, rough waveforms and irregular energy distribution. Spectrogram analysis shows that the actual sound of the sound is generated by the drops of small particles falling strongly on the calm plane in the wide band evenly in the natural environment. The created negative spectrogram roughly shows the irregular tapping on the thin panel through numerous beads or granules. However, it can be seen that it generates artificial white noise comparable to natural sound. The waterfall sound shows that small particles of a certain size generate sound with constant continuity for a certain period of time irregularly. The sound generated by the continuous friction caused by the continuous drop of beads of numerous small particles to the thin panel, and the similarity was used as frequency analysis.

5. CONCLUSION

Content research using sound is being activated such as ASMR, audiobook, and radio drama. The Foley sound research, which is made to express actual sound as a tool, is also meaningful as a sound content to experience the original sound activity in the early stage of broadcasting. The study of the sound made in the waterfall sound studied in this paper is in line with the existing sound made in the rain and the sound made in the waves. Waterfall sounds use beads like rainy sounds and waves, but the amount of beads is more than rainy sounds and less than waves. Also, in the characteristic of falling continuously from top to bottom, it should be expressed as continuous sound like rainy sound and shower water sound. The similarity of the waterfall sound was very high as shown in the acoustic analysis tool, and the preference for using it as sound contents was high. If the characteristics of the actual sound are closely analyzed and the correct tools are selected based on the analyzed originating principle and sound is generated, it is expected that various cultural contents will be developed with various developed sounds. Of course, the reality is somewhat lower than the actual sound, but it is highly likely to be developed as a sound experience content because it mimics the actual sound using the tool. The instrument of sound made is highly valuable for performance, which is sound content, for creativity and interest. It is also likely to be an exhibition experience content that is placed in the exhibition experience space and actually touches and sounds. Also, it is highly likely to develop the sound made using the tools by studying the sound generation principle of the actual sound because it is worth developing as a physical, mechanical, and scientific tool.

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