A Study of Sound Contents Development based On Analysis and Compare Foley Sound to Actual Sound of Wind

Ik-Soo Ahn [#1], Seong-Geon Bae [*2], Myung-Jin Bae [**3]

[#1] Information and Telecommunication of Department, Soongsil University,
369, Sangdo-ro Dongjak-gu, Seoul
[1] aisbestman@naver.com
[2] sgbae123@empal.com
[3] mjbae@ssu.ac.kr

Abstract—Foley sound of wind is often used as a background sound of radio drama in early period of broadcasting. It is one of the tools that has applied the most creative and scientific theory. This research provides scientific proof on similarities and creativity of Foley sound of wind through comparison and analysis of Foley sound and the actual wind sound.

Keyword- Foley sound of wind, radio drama, creative, scientific proof

I. INTRODUCTION

In the early period of radio drama sound effect was necessary to explain unseen background and action of actors to the auditors. At the time, as small portable recorder was not available it was not possible to utilize recorded sound in the drama. Development of Foley sound at the time has been progressing continuously through radio drama. This research suggests possibility of developing wind Foley sound into a sound contents by comparing and analyzing it with the actual sound.

II. RESEARCH ON FOLEY SOUND OF WIND

Wind sound is often used as sound effect in radio drama when expressing winter environment or symbolizing a vast wilderness. In the early period many tools for imitating sound were developed and among them wind sound was the one that has utilized the most scientific theory in terms of making Foley sound.

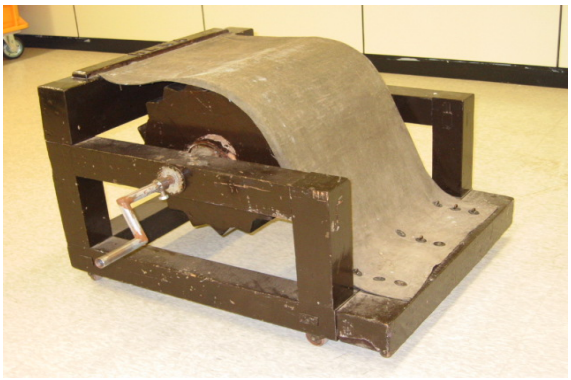
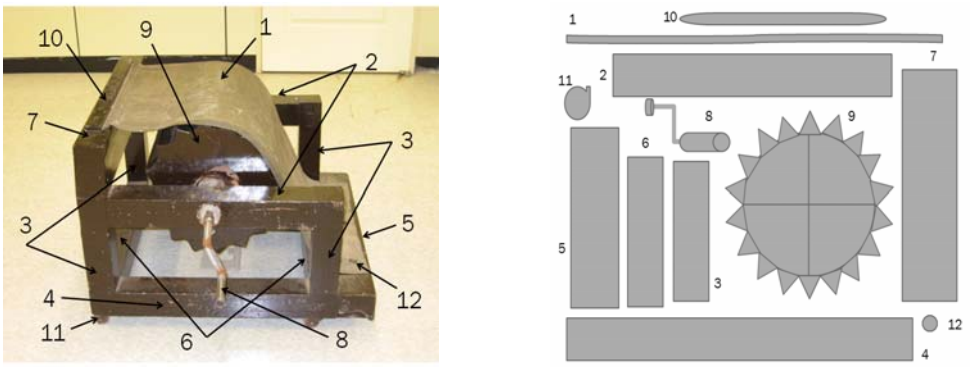


Fig 1. Foley Sound Tool of wind

The idea of describing actual sound by using tools can be obtained from the production theory of actual sound. Wind sound is produced when fast moving air caused by difference in atmospheric pressure makes friction with stagnant air. To make wind sound this research has adopted friction as its core theory and applied circulation movement theory as a supplementary theory to sustain sound.



1. Tent cloth, 2.The upper horizontal support wood frame, 3. Vertical supporting wood framework, 4. Below the horizontal supporting wood framework, 5. Framework for supporting the tent in front of the tree, 6.Support for vertical or horizontal wooden frame under, 7.Framework for supporting the tent on the tree, 8. Rotating knobs 9.The cylindrical rotating, 10.Fixed the tent on a wooden frame, 11.Wheels for moving, 12. The front of the tent fixed buttons

Fig 2. Component for Foley Sound Tool of wind

In terms of components required for sound production there are cylindrical wooden rotation body surrounded by triangular pillar and highly durable tent fabric with thick and rough texture. The whole body of pillar and rough fabric are placed on strong wooden structure and the sound is produced as they make friction. For the wind sound production it was thoroughly designed based on scientific theory. About 12 types of components required for production are prepared. For Foley sound it is made from friction and rotating activity, furthermore, its size and strength can be expressed by different rotation speed of the tool. If pillar rotates faster the sound becomes louder and in contrast, the sound decreases and becomes mild if speed is slower.

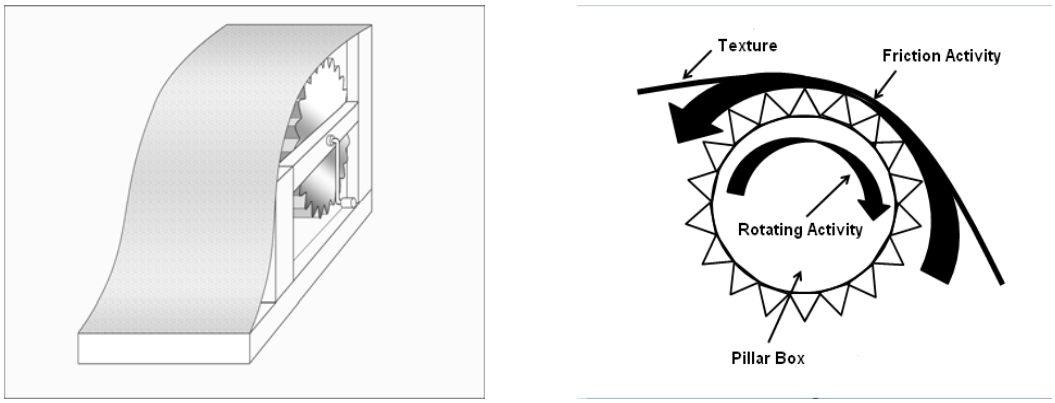


Fig 3. Principle of artificially making the sound of wind using Foley tools

As shown in Picture 3 the exterior appearance of tools for making imitation wind sound look like agricultural or industrial machine or even like an artwork. These scientific and creative tools are used as materials for making great sound contents.

III. COMPARE FOLEY SOUND AND ACTUAL SOUND OF WIND

As wind sound changes all the time very delicate comparative analysis is required to compare Foley sound with the actual sound. Foley sound of wind means speed and strength of friction from level of rotation activity and thus, the focus of this research is rotation activity and friction. For comparison and analysis of frequency characteristics of Foley sound and actual sound time domain, spectrum, and spectrogram were analyzed. Reliability of research was increased by MOS test. These analyses can tell us the similarity between the two sounds and provide creditable data. Various frequency ranges were studied using FFT method.

$$Frequency\_energy = \frac{1}{N}[\sum_{n=1}^{N}(FE_1(n) - FE_2(n))^2] \quad (1)$$

FE1(n) is the frequency of actual wave sound and FE2(n) is that of Foley wave sound after converting it using FFT. The above equation calculates the difference between the two frequencies and the result shows the similarity between the two. Equation 1 shows the similarity between the two sounds via energy difference. Among the characteristics of wind sound, to compare continuity and repeatability with actual sound time domain analysis was adopted.

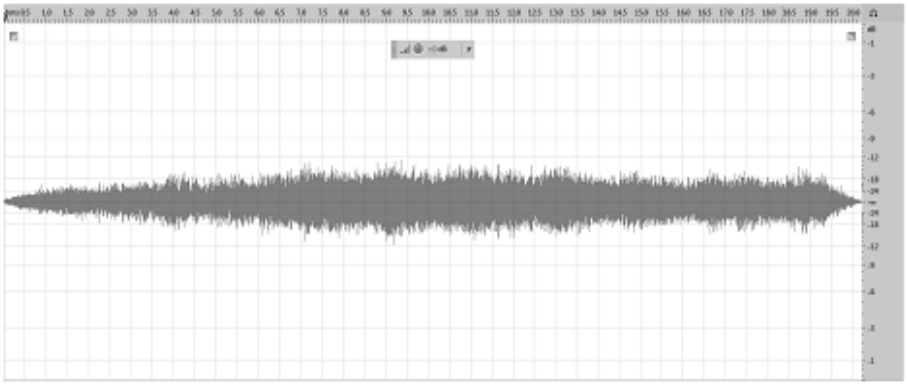


Fig. 4. Analysis in time domain about Actual Sound of wind

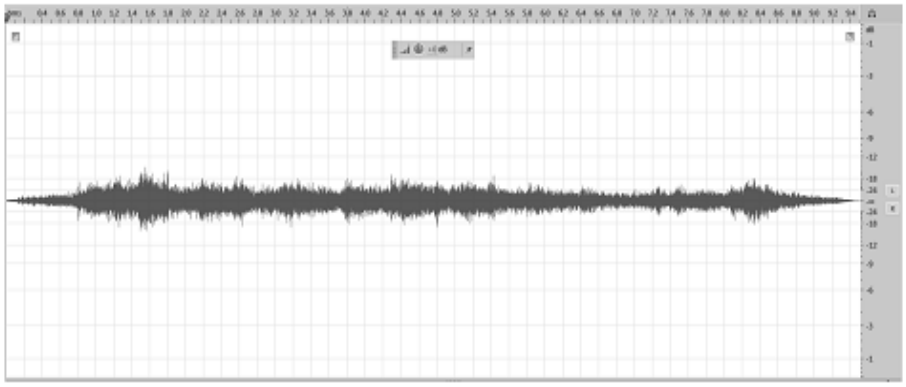


Fig. 5. Analysis in time domain about Foley Sound of wind

As shown in wave form of Picture 4 and 5 there were little difference between strength and frequency bandwidth but they had similar basic tone. Considering the fact that wind has different strength and rhythm depending on the time it was identified that they have similar continuity and repeatability as a result of going through time domain analysis. Frequency range of actual and Foley sound was compared and analyzed through spectrum analysis. By comparing each frequency range and analyzing result shown in each frequency range they were proven to be similar. Based on the conclusion shown in Picture 6, actual wind sound reached its peak point around 500Hz low frequency range and after 2kHz the graph was in a parallel line from middle to high frequency range, this proves that actual wind sound is mainly made up of low sympathetic sound. Compared to actual wind sound Foley sound had relatively lower peak group in low frequency range but in general, had the alike sympathetic characteristics. In contrast, Foley sound had stronger distribution in middle and high frequency range. The reason for Foley sound showing stronger distribution in middle and high frequency range is because in case of actual wind sound the sound is dispersed in a wide space like nature but for Foley sound it is recorded in a closed space and friction sound is made much stronger by artificial tools.

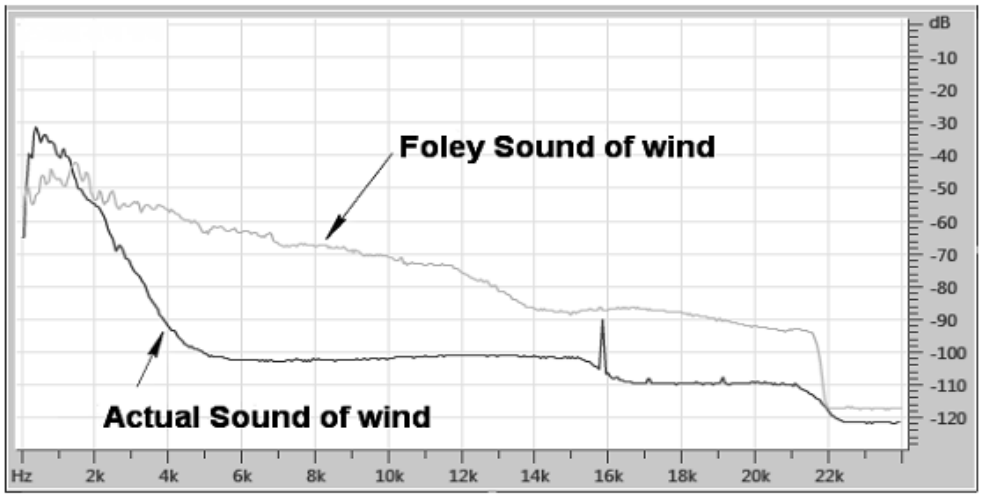


Fig.6. Analysis of frequency Compare Foley sound and actual sound of wind

To find out about overall distribution condition of components of actual and Foley sound spectrogram was adopted. Scale and sound components natural wind sound and Foley sound were compared.

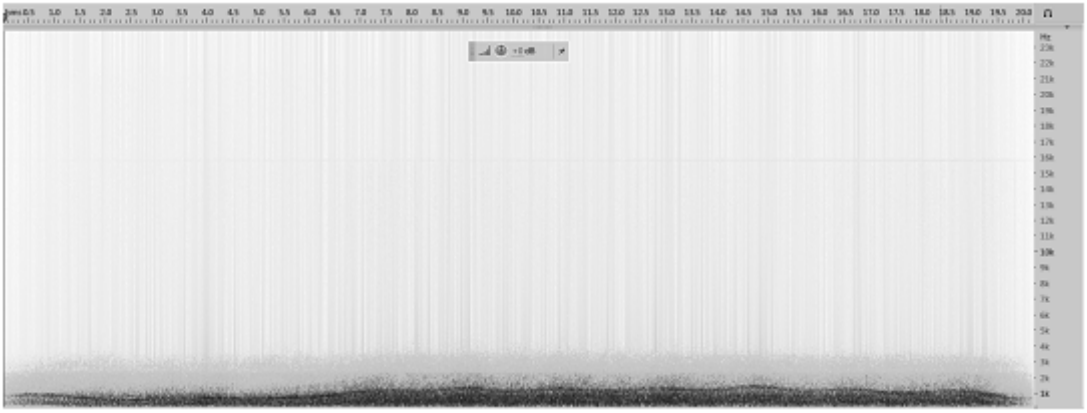


Fig 7. Spectrogram Actual sound of wind

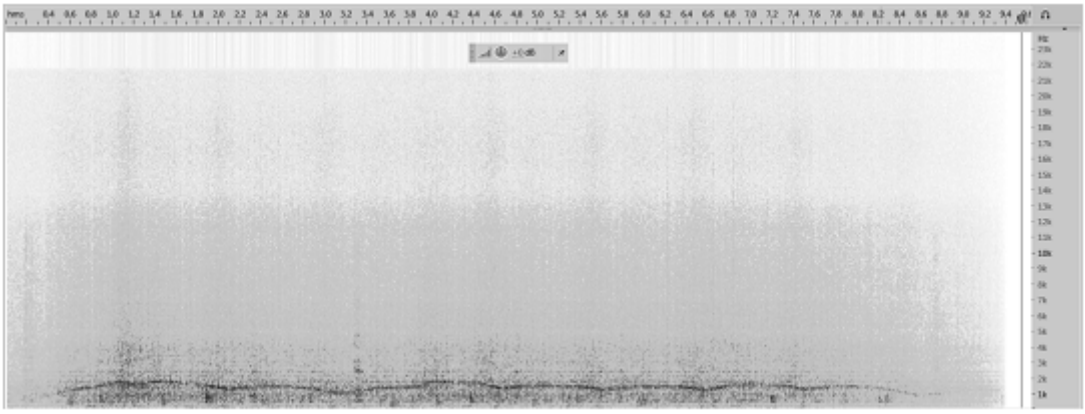


Fig 8. Spectrogram Foley sound of wind

As shown in Picture 7, natural outdoor noise, white noise was not clearly shown in actual wind sound but it was rather included in the basic sound. For Foley sound , as shown in Picture 8, it had similar base tone with the actual sound but white noise that is shown in natural sound was shown very clearly even if it was made in the studio.

IV. RESULTS

For more thorough verification of similarities between actual sound and Foley sound of wind MOS test was carried out. In terms of MOS test auditors were set to hear both actual sound and Foley sound of wind and score their similarity and preference for the effective use. The result was processed into data to be used as a tool for increasing reliability of analysis on Foley sound of wind.

Table 1. MOS Test about Foley sound and actual sound of wind

Sound category	A	B	C	D	F
Actual sound of wind	5.0/4.9	4.9/4.9	4.9/4.8	5.0/4.8	4.9/4.9
Foley sound of wind	4.9/4.8	4.8/4.8	5.0/4.9	4.8/4.9	4.8/4.7

Maximum score: 5 each, Scoring category: Similarity score/ Preference score

As a result of MOS test A auditor scored 4.9 for saying that Foley sound is very close to actual sound after hearing both sounds. Also, in preference testing showing its application as effective sound A gave a high score of 4.9. Moreover, C auditor scored 5.0, thinking that Foley sound is more realistic than the actual sound and for preference, the score was high of 4.9.Other auditors had little difference in their scores and similarity score of

Foley sound to the actual sound decreased a bit, however, preference score meaning its application as effect sound was almost the same. For time domain there was a small difference in sound wave and strength of actual and Foley sound but in general, they had the same continuity and periodicity. Through spectrum analysis it was identified that they showed similar save form in almost all the ranges. Therefore, through spectrum analysis, it was confirmed that components of sound are so much the same. It was understood that Foley sound of wind had similar characteristics with the actual sound through MOS test and when it is used as effect sound, there was no difference in preference.

V. CONCLUSION

In this research it has compared and analyzed Foley sound and actual sound of wind based on scientific theory to identify its value of application as sound contents. During research method production theory and method for producing Foley sound were studied. To conclude, this research was able to find theory of producing Foley sound of wind and it was more scientific and systematic. As this Foley sound well represents characteristics of high and low frequency it can easily show the actual sound. Based on production process and application method of Foley sound it was concluded that Foley sound of wind has high potential to be developed as sound contents.

REFERENCES

[1] S.G. Bae, M.J. Bae, “A New Speech Coding using Harmonics Emphasis Filter,” ISAAC 2013, AACL Vol. 1, pp. 43-44, November 2013.
[2] Ik-Soo Ahn, "Take care of the sound foley artist", Hyo hyeong Press, 2010.
[3] Byeong-Woong Gwon, "The culture of cultural content industry R & D Systems Research", Korea University doctoral dissertation. 2009.
[4] Ui-taek Lim, effective sound effects fabrication process research, video production concessions Song Dam undergraduate majors full-time university professor Broadcasting, No. 22, Journal of Vision, 2006.
[5] Jong-Dae Bae, "multi-channel broadcasting and production planning period," bakmungak Publishing, 2003.
[6] Be less, "the story broadcasters", to sow the people, 2001.
[7] Sang-Hyeon Gang, chaebaek, "understanding and use of the mass media", hannarae Publishing, 2001.
[8] Bong-jung Lee, "A Study on the Evolution of broadcasting sound effects", the Central University School of Journalism Master's Thesis, 1997.
[9] Jang-hwan Oh, "Revitalization multimedia radio multi-channel era", Yonsei University Graduate School of Media Relations Master's Thesis, 1997.
[10] Jae-joon Kim, "Fast-paced era of birds and bows radio room", 1996
[11] Jae-hun Shim, "Broadcasting sound effects", the domestic academic articles, the Korea Broadcasting System, 1969.

A correspondence author is prof. Myung-JIn BAE

AUTHOR PROFILE

Ik-soo Ahn He received the M.S. degree in Electronics Engineering from JoongAng University. He is currently the under Ph.D. at Soongsil University.

Seong-Geon Bae He received the M.S. degree in Electronics Engineering from Konkuk University. He is currently the Ph.D. degree at Soongsil University in 2014. He is currently the Professor of the Dept. of Broadcasting Sound & Visual at Daelim University.

Myung-Jin Bae He received the Ph.D. degree in Electronic Engineering from Seoul National University in 1987. He is currently the Professor of the Dept. of Information & Telecommunication at Soongsil University. He has authored and coauthored more than 300 journal articles and conference papers. His research interests are Speech Signal Processing, Audio Processing and Speech Communications.