

# A study on the Sound Effect of Footsteps used in Radio Drama

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**Abstract** - In radio dramas, sound effects are very important because you have to listen to the sound only, imagine the scene, and understand the story. In this paper, we studied the sound of footsteps that express the situation and movement of characters in the field of sound effects that help for story development in radio drama. The sound of footsteps is one of the most important radio drama sound effects because they can carry various information about the characters and express the place and situation of the scene. Since the expression of the sound of the footsteps plays the most basic and important role in the sound effect of radio drama, it is necessary to express it carefully through thorough analysis and research. As a method of researching the sound effects of the sound of the footsteps in radio drama, we studied what information can be contained in the sound of the footsteps and how the sound of the footsteps are used through the method of using the sound of the footsteps, the method of making the sound of the footsteps, and component analysis of the sound of the footsteps.

**Keywords** — radio drama, sound effects, scene, story, the sound of footsteps, characters.

## I. INTRODUCTION

After the birth of the broadcasting medium, efforts to deliver stage dramas to listeners through the medium of radio created the genre of radio drama. Radio drama is expressed by dialogue and sound effects and is a new genre in which a story can be freely used using sound without being limited in time or space. The sound effects of radio drama mainly include a material effect that expresses background sounds and mechanical sounds and a poly effect that expresses the psychological state of a person with a whole body. In addition, a musical effect that plays a role in raising the atmosphere is also needed. Since radio dramas have to be expressed only with sound, it is necessary to implement sound effects to help listeners imagine and understand the play. In this paper, we studied the sound of the footsteps in the Foley Effect among the sound effects of radio drama. The sound of footsteps is an important sound that represents most of the character's information in radio drama that is expressed only in sound. We studied the role of the sound of the footsteps in radio drama in various ways. For the study of the sound of the footsteps in radio drama, the technique of

directing the sound of the footsteps effect in radio drama was examined, and the survey was divided into the analysis of the sound of the footsteps for setting gender characters through the analysis of the sound of the footsteps for a place setting, and the analysis of the sound of the footsteps for situation setting. The sound of the footsteps was recorded according to the situation and investigated using a sound analysis software tool. The digital recorder H2 of ZOOM Corporation was used as the recorder, and the audition program of Adobe Corporation was used as the analysis software.[1][2][3]

## II. RADIO DRAMA

Radio drama refers to the form of play expressed only with sound through the medium of radio. Since wireless communication broadcasting began with the invention of the radio, numerous efforts have been made to create programs for broadcasting. The genre that was born out of these efforts was a radio drama, and the origin of radio drama came from the spread of the play. Radio drama is a genre in which sound experts from various fields gather and listen only to the sound, expressing the movements of the characters in the imaginary space of the mind and directing the story development to impress the listeners. Regardless of the country in the world, the earliest radio dramas applied the stage arts that existed before radio to radio. As for the technique, the focus was on how to understand stage play only by hearing. Around 1925, five years after the world's first broadcast began, the first drama for radio was produced. With this opportunity, the name radio drama was born. Early radio dramas were only slightly modified so that they could be understood by listening to stage plays with their ears but gradually discovered radio-like materials to create a unique world different from conventional stage plays. In 1924, which is also the beginning of a radio drama, Richard Hughes of England's <Inside the Coal mine> is a work that depicts the human mind trapped in the darkness inside the coffin. It appeals strongly to the sound of water, explosions, hymns, choirs, lines, and silence. In this way of dealing with a world without vision, a cinematic technique was introduced around 1930 by Lance Sieveking of England and Rudolf Arnheim of Germany, which freely transforms scenes without being restricted in time or space. Became. Next, by Norman Corwin of the United States, a world of fantasy that appealed to the listener's imagination, etc., appeared around 1940. In other words, radio drama is a



genre that freely makes full use of the three auditory elements of dialogue, music, and sound, just changing the visual elements of a stage play aurally.[4][5]

### III. STUDY OF THE SOUND EFFECT OF FOOTSTEPS IN RADIO DRAMA

In radio dramas, The sound effect of footsteps are the basis of the effect and are one of the most important sounds. It not only expresses the psychological state of the character but also expresses gender, occupation, and status and can describe the background according to history and times. In particular, it plays an important role in suggesting the background, expressing a three-dimensional sense of space and distance, and creating a dynamic description. In radio dramas, The sound effect of the sound of the footsteps was studied from various perspectives. First, the type of footsteps expressed in radio dramas was analyzed, and second, the method of creating the sound effect of footsteps was studied. Third, The sound effect of footsteps was analyzed for setting gender characters, the sound effect of footsteps for location setting, analysis of the sound effect of footsteps for situation setting, etc., largely divided into three categories.[6][7][8]

#### A. Analysis of footstep sound types expressed in radio dramas

Among the sound effects of radio dramas, the types of footsteps sound that directly and indirectly explain not only the character's character, that is, style, personality, and psychological state, but also the place and situation of the scene were analyzed. The sound of footsteps is the most used sound effect material in radio dramas and requires a long period of training because they have to describe various situations within a limited space, and experience and experience are directly related to their ability. The expressions of the sound of footsteps are broadly divided into footstep types according to the type of shoes, footstep types according to the situation, footstep types according to places, and footstep types according to the angle of the walking side. The expression of the sound of footsteps according to the situation is solely the responsibility of the person in charge of the Foley effect. It is standard to have the sounds of footsteps stand up as much as possible and put on the weight, but when one person in charge of the Foley effect needs to express the sound of footsteps of several people, sit upright in a chair and relax on the ankles, knees, and pelvis, and make an unspecified surface with appropriate intensity. It makes a sound while stepping irregularly.

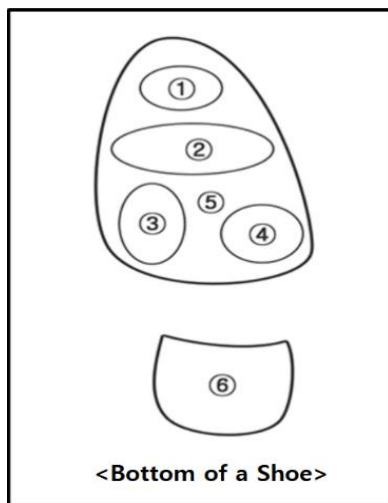
**Table-1 Various types of the sound of footsteps used in radio drama**

Footstep sound types	Classification	Contents
by shoe type	Suit shoes	The sound of footsteps by a man is the "ddubug ddubug" sound, the sound of footsteps by a woman is the "ddogag ddogag" sound, which is used almost symbolized in radio dramas.
	Military/ climbing boots	Shoes with urethane soles and heels are useful because they are similar to footsteps in military boots or hiking boots.
	running shoes	It is a principle to wear sneakers, but in scenes where various types of sound of footsteps appear, you should also express sneakers while wearing general shoes.
by mood type	When feeling good	Pleasant footsteps are cheerfully expressed as if you are marching while listening to a marching song.
	When feeling bad	When I feel bad, when I am sad, when I am in pain, when I am lonely, my footsteps are powerless.
	When hurry/ When angry	Rather than expressing clearly, it is expressed so that the sound of footsteps feels a bit floating and without weight.
	When drunk	The sound of The drunken footsteps staggering as if falling with a loose leg is a difficult motion to imitate without first experiencing it.
by location type	inside	The sound of indoor footsteps should sound clean floors in offices, corridors, building lobby, halls, auditoriums, etc., and give the sound of large and small spaces.
	outside	The sound of outdoor footsteps is expressed differently depending on the condition of the road surface. There are sidewalk blocks, concrete roads, mountain roads, forest roads, sandy beaches, and gravel roads in unpaved dirt roads, and main roads and snow roads according to weather changes.
Type according to the angle of	flat road	The sound of footsteps that appear most often in dramas is the sound of footsteps walking on the flat road, which can be said to be the most basic footsteps.

the walking surface	uphill road	On the uphill road, it is a mountain or a hill that forms a higher angle than where he is standing, so the front of the foot is supposed to touch the ground first.
	Downhill road	It creates a sound by touching the bottom of the shoe and the heel almost simultaneously. Almost at the same time, but with very slight differences, the front floor comes first.

### B. Study on how to make the sound effect of footsteps

When directing The sound of footsteps in a radio drama studio, it is often necessary to express the sound of footsteps in various situations on flat ground with a flat floor. In that case, you need to effectively use the side of the shoe and express various the sound of footsteps. The sound of footsteps mainly varies depending on the angle of the side where the shoes are closed to the floor, and the sound of footsteps of the road going up and the footsteps going down are expressed based on the flat ground. Normally when walking on flat ground, the heel of the shoe is first put on the front floor, and when going up, the front floor is first followed by the heel. On the downhill, the front and back are almost simultaneously stepped. The difference in degree is proportional to the difference in the angle of the walking surface. In addition, the sound of footsteps can be expressed in various ways depending on the type of shoe, the place, and the variable of the situation. The sound of footsteps is the sound that occurs due to friction between the shoes and the ground, but the expressive power created in harmony with the actor is more important. It should be noted that the sound of footsteps of walking or jumping in a hurry, and the sound of footsteps weary when climbing, are portrayed in a more realistic way only when they are well combined with the realistic breathing smoke of the performer.



**Fig. 1 Shoe sole for the sound effect of footsteps**

The step of stepping on the flat ground is ⑥→⑤ first in the order of the heels and then the sole of the shoes. The order of footsteps when running or walking up a hill is ⑤→⑥ first on the floor and then back. Also, the speed and

strength vary according to the running speed and the angle of the hill. When going down the hill, the footsteps hit the heels and floor ⑤+⑥ almost simultaneously. When you go up the stairs, you almost push the floor ⑤ vigorously. As for the sound of footsteps of women's high heels, it is a principle to put on high heels and make a sound. When it is necessary to make the sound of children's sneakers with men's shoes as the next best option, step on the sound in the order of ②→③, ②→④.

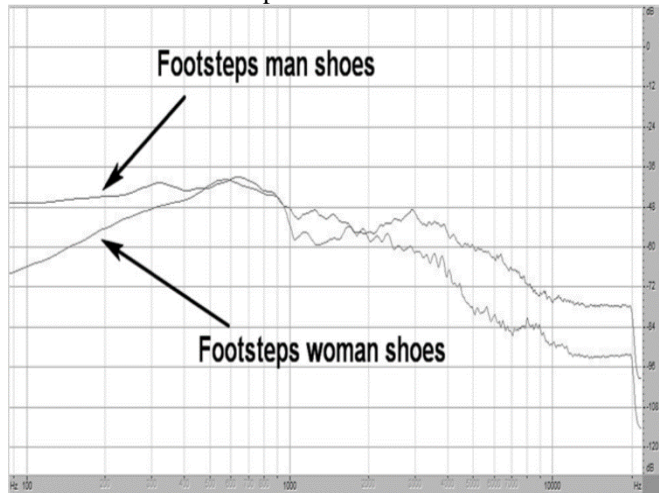
### C. Analysis of the sound component of footsteps expressed in radio drama

The sound component of each sound of a footstep was analyzed by sound engineering to see what kind of auditory component the sound of footsteps used in radio dramas are transmitted to the listener and feel the response. The sound component analysis of the sound of footsteps was divided into three parts: the sound of footsteps analysis for gender character setting, the sound of footsteps analysis for a place setting, and the sound of footsteps analysis for situation setting. Analyzing which part within the human audible frequency band is generated as a sound component in the corresponding sound of footstep and transmitted and felt to the listener can be helpful in researching various the sound of footsteps that can impress.[9][10][11]

#### a) Analysis by the sound of footsteps for gender character setting

The sound of footsteps that distinguish gender is divided into the sound of suit shoe footsteps. Of course, the sound of footsteps of hiking boots and sneakers are difficult to distinguish between male and female footsteps unless expressed in weight. In general, the sound of footsteps of men and women can be clearly expressed with the sound of suit shoe footsteps. The men's sound of footsteps is mainly expressed by the sound of suit shoe footsteps of shoes, and the women's sound of footsteps is mainly expressed by the sound of footsteps of high heels. In terms of sound, the footsteps of the men's sound of suit shoes sounded "ddubug ddubug," and the footsteps of women's high heels sounded "ddogag ddogag." Since the sound is clearly distinguished, the sound of footsteps of men and women in radio dramas can be classified as the sound of suit shoe footsteps among the types of shoes. In addition, you can distinguish your status and age by using the sound of suit shoe footsteps. With the sound of footsteps, you can set a person's identity, such as gender, age, and occupation. First of all, the age at which shoes are often worn is adults and can be set as office workers. To study the characteristics of the sound of suit

shoe footsteps, adults and office workers were selected as models, and the characteristics were compared by recording male and female footsteps.

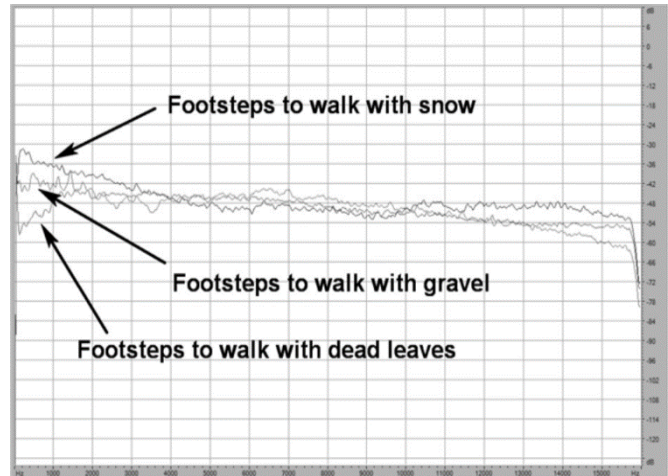


**Fig. 2 Spectrum analysis of the sound of suit shoe footsteps by adult man and woman**

Figure 2 is a spectrum graph analyzing the sound of footsteps by adult males and females through the sound of suit shoe footsteps. As a result of the analysis, the sound of footsteps by the adult men's shoes are characterized by a dull and heavy sound, so they form high energy and wide bandwidth over the entire band as well as in the low-frequency band compared to the sound of footsteps by the women's high-heeled shoes with light and sharp sound. It can be seen that the sound of footsteps of adult women footsteps is weak in the low-frequency band, and the entire band contains light and lively sound components.

#### ***b) Analysis by the sound of footsteps for place setting***

In radio dramas, data effects are used to explain the background of the place, but among the Foley effects, the sound footsteps express the place to help listeners' imagination. The types of the sound of footsteps according to the location are divided into the sound of indoor footsteps that describe offices, corridors, building lobby, hall, and auditorium, and the sound of outdoor footsteps that describe sidewalk blocks, dirt roads, mountain roads, forest roads, and white sandy beaches. Among them, I analyzed the sound of walking on snowy roads, the sound of walking on gravel, and the sound of walking on fallen leaves.



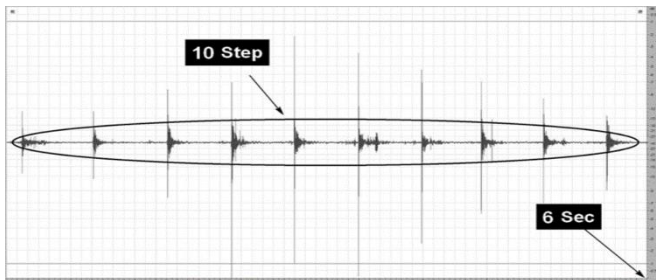
**Fig. 3 Spectrum analysis by the sound of footsteps according to floor characteristics**

Since the outdoor space has a unique floor surface and spatial environmental sound, it is possible to analyze the environment in which the subject by the sound of footsteps exists with the texture of the sound of footsteps generated by the bottom surface of the shoe. The texture by the sound of footsteps can be compared and analyzed through the spectrum graph. If you carefully understand the texture by the sound of footsteps and the surrounding sounds, you can set the place with just the sound of footsteps. The sound of footsteps in the city is the sound of walking on a sidewalk block or asphalt, and in the countryside, there are many unpaved roads, so there are many sounds of walking on dirt roads. When entering the forest, most of the grass or rocky paths are covered, and the seaside beaches are mostly covered with sandy beaches or pebbles, so the characteristics by the sound of footsteps are different. Figure 2 is a graph of analysis of the spectrum by the sound of footsteps according to the characteristics of the floor. The sound of outdoor footsteps can be expressed as the sound of stepping on fallen leaves in autumn or walking on snow in winter, depending on the weather and season. The sound of footsteps walking on snow is uniquely formed with low and high-frequency sound characteristics and is a sound that clearly expresses winter. The sound of footsteps walking on the gravel road form an appropriate frequency band over the entire band and can express a place along a river or a beach. The sound of footsteps walking on fallen leaves has a stronger sound component in the high-frequency band than in the low-frequency band and can express seasonal fall. In this way, it is possible to create a place and a season according to the setting degree of the floor where the sound of footsteps is made.[12][13][14]

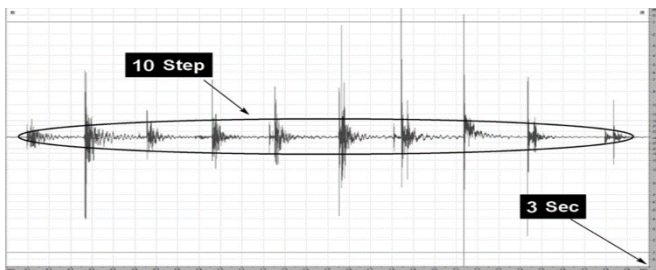


### c) Analysis by the sound of footsteps for setting situations

Through the analysis of the speed change and regularity by the sound of footsteps generated by the footstep subject, the situation of the character can be produced. By planting various information on the sound of footsteps, the listener can be informed of the situation of the characters forming the sound of footsteps. You can create a situation with different the sound of footsteps compared to a person's normal gait. Compared to the normal gait, the sound of footsteps of walking or running quickly indicates urgency, and if you walk slowly or without strength, you can guess that you are tired or in a bad mood. According to the pace of the sound of footsteps, the sound of walking and running was compared.



a. Time domain analysis by the sound of footsteps walking



b. Time domain analysis by the sound of footsteps running

**Fig. 4 Analysis of time-domain by the sound of footsteps according to speed**

Figure 4 contains two important pieces of information: The sound of footsteps walking and the sound of footsteps running. First of all, if you look at the time domain graph, the sound of footsteps 'a' is taking 10 steps in 6 seconds, but the steppings of b are doubled by stepping 10 steps in 3 seconds. In addition, it can be seen that the sound of walking footsteps of a shows strong energy only in the low-frequency band overall, and especially the first step shows strong energy and the part where next the sound of footsteps put up shows weak energy. On the other, the sound of footsteps 'b' footsteps show strong energy throughout the entire bandwidth, and it can be seen that the sound of footsteps

stepped on is repeated with strong energy overall.[15][16][17]

## IV. CONCLUSIONS

Radio drama is an interesting audio drama that was born when wireless communication was invented, and broadcasting began. It is the beginning of the drama genre that leads to TV drama. Radio dramas are made an only sound, and sound dramas are listened to by only sound. Radio dramas that can be heard only by sound require a variety of devices to replace the video of TV dramas, and sound effects play a big role. Particularly, among the sound effects of radio dramas, the sound of footsteps is important to unfold a story containing information about the characters. The gender, as well as the emotional state of the character, can be known, and it also describes the location and situation of the scene. As a result of the study, it was confirmed that the role by the sound of footsteps in radio dramas should be used in various ways, and it is confirmed an important sound that is absolutely necessary for setting the character's character, setting the place for the scene, and setting the situation for the story development. In addition, even if you look at the sound characteristics of the sound of each footstep, it has a unique personality that is clearly distinguished by frequency bandwidth. In the future, I hope that many radio dramas, a genre of healing that can be imagined and impressed while listening comfortably with closed eyes, will be produced by genre, and in addition, We hope that Sound effects by the sound of footstep and will be studied in various ways.[18][19]

## REFERENCES

- [1] Ki-ok Choi . Sambon Kim, Global Encyclopedia of the World』 , Book Publishing Bumhan, (2004) 239.
- [2] Nae Soo Lee, Story Broadcaster, The Seed Sower, (2001) 52.
- [3] Jin-Seok Jeong, Young-hee Kim, Jin-man Han, Yong-gyu Park, Jaegil Seo, 80 Years of Korean Broadcasting, Its Historical Lighting』 , Na Nam Co., (2008) 76.
- [4] Hang Jea Jho, History and Prospect of Korean Broadcasting』 , Hanul Academy, 2003, pp. 185-186.
- [5] Chang-bong Choi, Hyun-du Kang, 100 Years of Our Broadcasting』 , Hyunamsa Temple, (2001) 163.
- [6] Ik-Soo Ahn, Research on dramaturgy and initiatives of sound effects for radio drama, Chung-Ang University Master's Thesis, 2012.
- [7] Jae-Joon Kim, The Trend of the Rapidly Changing Era and the Way of Radio Broadcasting, (1996).
- [8] Jang-Hwan Oh, Measures to revitalize radio in the era of multimedia multi-channel, Master's thesis, Graduate School of Media and Public Relations, Yonsei University, (1997).
- [9] Bong-Joong Lee, A Study on the Transition of Broadcast Sound Effects, Chung-Ang University Journalism and Broadcasting Graduate School Master's Thesis, (1997).
- [10] Jae-Hoon Shim, The Sound Effects of Broadcasting Play, Korean Academic Article, Korea Broadcasting Center, (1969).
- [11] Ik-Soo Ahn, Foley Artist! Please Ask for the sound, Hyohyung Publishing Co., (2010).
- [12] Sang-Hyeon Kang, Baek Chae, Understanding and Utilization of Mass Media, Book Publishing Han Na-rae, (2001).
- [13] Eui-Taek Lim, A Study on Effective Sound Effects Production Process, Full-time Professor, Visual Production Major, School of Broadcasting and Imaging, Yongin Songdam University, Visual

- Design Research 22(2006).
- [14] Jeong, Chan-jung, and Bae, Myung-jin, A Study on the Classification of Amazed Sounds, The Acoustical Society of Korea, Annual Meeting of the Acoustical Society of Korea, ISSN 1225-441x, 26(2007) 57-58.
- [15] S.G. Bae, M.S. Kim, and M.J. Bae, On Enhancement Signal Using Non-uniform Sampling in Clipped Signals for LTE Smart Phones, IEEE ICCE-berlin, 125-126, ICCE-Berlin (2013).
- [16] Ik-Soo Ahn, Seong-Geon Bae, Myung-Jin Bae, A Study on the Necessity of Driving Sound and Driving Sound for Electric Power Simple Transportation System, Journal of Engineering and Applied Sciences 13(5)(2018) 1298-1303.
- [17] Seong-Geon Bae and Myung-Jin Bae, A Study on Recovery in Voice Analysis through Vocal Changes before and After Speech Using Speech Signal Processing, IJAER, 12(2017) 5299-5303.
- [18] Jong-Dae Bae, Planning and Production in the Era of Multi-Channel Broadcasting, Book Publishing Park Mun-gak, (2003).
- [19] Byung-Woong Kwon, A Study on the Research and Development System of Cultural Technology in the Cultural Contents Industry, Ph.D. Thesis, Graduate School of Korea University.