

A Study on the Sound Directing Technique for the Stereoscopic Production of Radio Drama

Ik-Soo Ahn ^{#1}

^{#1} *Electronic Information Engineering IT Convergence SoongSil niv*

369, Sangdo-ro Dongjak-gu, Seoul Korea

^{#1} aisgooman@ssu.ac.kr

Abstract - Radio dramas, which have been popular in radio media from early on by impressing listeners, are a traditional and special genre in that they are dramas through hearing. Even now, radio dramas are produced in each country and are impressed by listeners in the name of audio dramas through podcasts and various media. In radio dramas, the directing technique of controlling the sound is very important, as it is necessary to create a scene with only sound and lead the story to complete the entire work. This is because it is necessary to allow the listener to naturally imagine what situation is going on in what kind of scene just by listening to the sound. It is no exaggeration to say that the method depends on how realistic and stereoscopic the sound is described. In this paper, we studied a method that can be taken to control sound in three dimensions in radio dramas. The study was divided into three methods: a method of using near and far expressions, a method of expressing the position of the left and right, and a method of expressing the concept of space. As a result of the study, it was found that the richer the expression of stereoscopic sound, the higher the completeness of the radio drama.

Keywords — Radio dramas, podcasts, multimedia, scene, listener, stereoscopic

I. INTRODUCTION

After the birth of the broadcasting medium, efforts to deliver stage plays to listeners through the medium of radio gave birth to the genre of radio drama. Since radio dramas have to be expressed only with sound, it is necessary to implement sound effects to help listeners imagine the play and to make it easier to understand. In order to produce a radio drama, voice actors' dialogue and sound effects play an important role, but for a more realistic work, a production method for stereoscopic situational production is needed. In this paper, we studied a method to create a stereoscopic situation when producing a radio drama. In order to realize the stereoscopic situation of a radio drama, first, a method of expressing the distance or proximity is necessary. Second, it is necessary to manufacture considering the positional perspective using the left and right stereo concepts. Third, it is necessary to express a dynamic concept of space that expresses moving movements by synthesizing all the concepts of far and near and left and right. For the study, the concept of the preceding sound effect, that is, the Haas effect

was studied among the acoustic analysis characteristics related to the expression of far and near. Among the acoustic analysis characteristics related to expression for left and right stereo, the head shadow effect was applied and studied. The binaural effect related to the surround technique for expressing the dynamic spatial concept was studied.[1][2][3]

II. A study of Stereoscopic sound directing in radio dramas

Radio drama is a drama of sound produced only by sound and heard only by sound. Since it is a drama made only with sound, it is inevitably less expressive than the situational description of the scenes shown in TV dramas or movies. Instead, radio dramas require a stereoscopic directing technique unique to radio dramas that can replace the images of TV or movies. The radio drama's sound production technique rather makes the charm of the radio drama stand out more and more. To describe the story of a radio drama in three dimensions, an ON (near distance)/OFF (far distance) method that explains the sense of distance, a stereo method that expresses the position, and a spatial movement method that expresses the spatial dynamics are needed. First, the ON (near distance)/OFF (far distance) method for explaining the sense of distance can be described based on the preceding sound phenomenon, that is, the Haas phenomenon in the acoustic analysis area. To explain the second stereo method, it can be explained based on the Head Shadow Effect. Third, in order to explain the spatial dynamics, we can study based on the binaural phenomenon (virtual stereoscopic sound source).[4][5][6]

A. ON (near distance)/OFF (far distance) technique to describe a sense of distance

The most important and frequently used sound directing technique in radio dramas is the ON/OFF technique that expresses a sense of distance. ON is a method of recording the voice actor's voice close to the microphone, and OFF is a method of recording the voice actor's voice relatively far from the microphone. This recording method is a basic way for listeners to express a spatial stereoscopic effect in which the characters are near or far away. This sense of distance is based on the preceding sound phenomenon among people's auditory sensation capabilities. The Haas effect is based on a phenomenon in which two sounds feel as if they come from the center when listening to the same sound from two



speakers. That is, when the same sound occurs at the same distance on both sides, the sound image perceived by the hearing is felt as a stereoscopic (center) sound (mono). This state is determined as a mono acoustic state.[7][8]

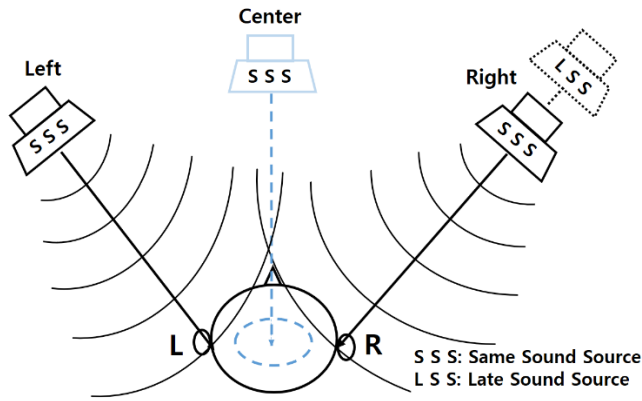


Fig. 1 Haas effect

After that, if the sound source generation time of the two speakers is gradually changed, the phase of the sound that is heard changes gradually. When one phase is closer, the other phase feels relatively distant. You can use the ON/OFF technique by artificially bringing one side closer and the other farther apart and recording with a difference in the sense of distance. In other words, when both sound sources are the same SSS (Same Sound Source), the sound is identified in the center of a mono phenomenon, and when one sound source is LSS (Late Sound Source), it becomes stereo. In addition, when the sound source of the two speakers is heard in different sounds, the sense of distance between the sound on both sides is felt more clearly. These auditory phenomena are called Haas or Precedence. The expression of the sense of distance can be explained based on the preceding sound effect, that is, the Haas effect.

B. Left and right position expression technique using Head Shadow Effect

Head Shadow Effect is a phenomenon in which the position of the left and right sound is clearly recognized by the difference in distance between the sound and the two ears. This phenomenon is caused by a distance difference in order for the sound generated from a certain place to reach the ears located on the left and right sides of a person's face. You can check the left and right positions. In this way, time difference and phase difference are made between the sound source and the two ears so that the direction of the sound source can be detected. This Head Shadow Effect is a useful phenomenon because it can clearly convey left and right stereo phenomena to listeners in radio dramas.[9][10]

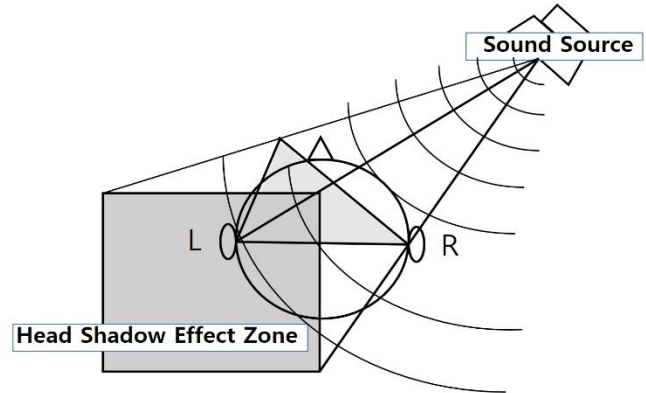


Fig. 2 Head Shadow Effect

In radio dramas, several characters appear. I try to make a stereoscopic production by installing several microphones. Although it is possible to artificially express a sense of direction using a sound editing program, the voice actors are positioned based on the microphone and promised to each other to express a natural sound. The stereoscopic production method of radio dramas based on the Head Shadow Effect creates a stereoscopic effect of sound by making sense of the direction and sound field of the sound source.

B. Surround stereoscopic production technique using Binaural Effect

The binaural effect is a method of creating a stereoscopic sound field by using multiple speakers. When producing a radio drama, the sound is produced using multiple channels, keeping in mind that it will be output through multiple speakers. In a radio drama, a stereoscopic radio drama can be realized if each dialogue of several characters, various sound effects, and music are harmonized with each other and expressed reasonably through several speakers. Radio dramas mainly use the stereo method using two speakers the most, but these days, they are often listened to in a surrounding environment using multi-speakers beyond 5.1 channel environments. The binaural phenomenon is also used as a method of generating a virtual stereoscopic sound source and is mainly a method of creating a stereoscopic sound. By making good use of the human hearing ability, a number of sound sources of more than 4 channels are implemented through multiple speakers so that a person feels a stereoscopic sound source.[11]

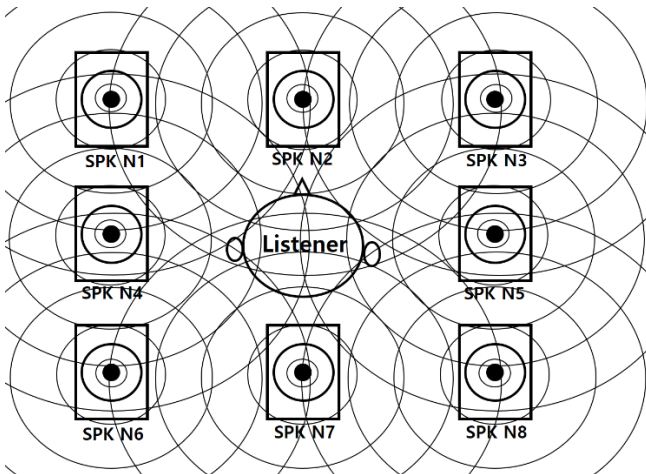


Fig. 3 Stereoscopic production technique using binaural effect

Various sounds are appropriately implemented in multiple speakers so that the listener can feel a stereoscopic and dynamic auditory sensation. In order to produce a radio drama, the binaural effect, which is an acoustic characteristic that helps to recognize a stereoscopic sound by synthesizing various sound sources, is appropriately used. In radio drama, stereoscopic situational production makes the situation of the radio drama more realistic and effectively describes the situation and scene to be expressed so that the listener understands the story well and is moved.

III. Movement situational production during a radio drama production

Dynamic situational production for radio dramas makes radio dramas more realistic by appropriately depicting moving characters and sound effects. In order to seek dynamic sound production of radio dramas, rational use of studios producing radio dramas is important. The studio for producing radio dramas is a studio dedicated to radio dramas designed with this dynamic production method in mind. For the stereoscopic production of radio dramas, it is important to design a dedicated studio for radio drama production, but it is also important to utilize the studio effectively. As a studio for producing dynamic and stereoscopic radio dramas, we introduce a radio drama studio of KBS(Korean Broadcasting System) in South Korea. Fig. 4 is a production studio for dynamic and stereoscopic sound production with KBS's radio drama studio RS-15.

KBS radio drama production studio RS-15 in South Korea is the largest in Asia. In the studio, there are 5 microphones for dialogue, monologue, and commentary for voice actors' acting, one for the micro props for the poly effect, two for footsteps, and one for large tools. In addition, radio dramas are produced in various ways, such as modulating the voice by installing two microphones in the filter box installed for a no reverberation environment. First, we looked at the studio's microphone settings and functions for the stereoscopic production of radio dramas, and then we looked at the studio's space utilization for directing the movement when producing radio dramas. Lastly, we studied the specific matters that the studio should keep when producing radio dramas.[12][13][14]

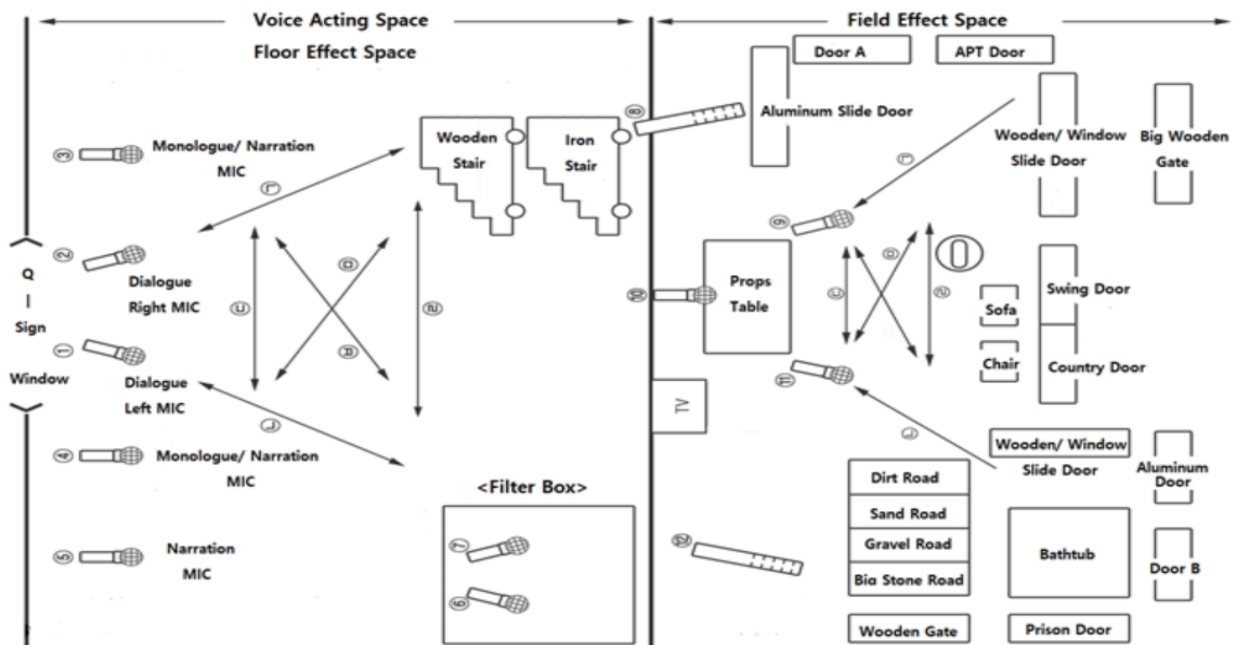


Fig. 4 KBS radio drama production studio drawing

A. Microphone settings and functions

There are mounted on 5 microphones in the voice actors' acting space, 5 microphones in the Foley effect space, and 2 microphones in the filter box, for a total of 10 microphones. In the radio drama production studio RS-15 of KBS in South Korea. Looking at the picture in Fig. 4, the studio is divided into left and right halves, and the left is used as the floor effect space of the voice actor and the floor effect of the

Foley effect, and the right is used as the field-effect space of the Foley effect. Table-1 is a table listing the overall microphone settings and usage details of radio drama studios. As shown in Table-1, microphones are arranged according to each application purpose, and voice actors and Foley effect managers produce radio dramas by effectively using microphones according to the situation. [15][16]

Table-1. Microphone settings and usage details of KBS Radio Drama Studio (RS-15)

MIC NO.	Microphone use	Microphone usage content
①, ②	Voice Actor microphone	A space for Voice actors and Floor effect man
③, ④	Monologue and narration Mic	Used for self-talk (monologue) and narration
⑤	Commentary microphone	Microphone use only for long time commentary
⑥, ⑦	Microphone in the filter box	It is space used to record sound dialogues in the headset and speakers. In radio dramas,
⑧, ⑫	Boom MIC for large tools	Right and left microphones for large props
⑨, ⑪	Mic for footsteps and props	Mic for sound collection caused by footsteps and body movements
⑩	Special microphone for props	Mic space for making props sound

B. Directing the movement when producing a radio drama

KBS radio drama production studio RS-15 in South Korea is the largest radio drama production space in Asia. It is divided into space where the voice actor, the floor effect man of the Foley effect are active, and space where the field-effect man of the Foley effect is active. Each room has the same number of microphones and is placed at the same location, with 5 in the voice actor space and 5 in the Foley

effect space. Microphone usage is described in detail in the microphone setting status and function in 4.1. In 4.2, when producing a radio drama, I explained the directing that uses the space of the studio based on the microphone. The details are shown in Table-2.[17][18] in 11 pt Regular font. Author affiliation must be in 10 pt Italic. The email address must be in 9 pt Courier Regular font.

Table-2. How to create a motion recording in a radio drama studio

Motion NO.	Motion classification	Motion directing content
㉑, ㉒	Distance Sense of ON(Near)· OFF(Far)	The voice actor and the person in charge of the Foley effect move together in the front and field spaces, moving forward (ON) and backward (Off), creating a sense of distance.
㉓, ㉔	Space change moving left and right	It is a movement line in which the voice actor and the person in charge of the Foley effect move together in the front and field spaces and move left and right to create a spatial change.
㉕, ㉖	Movement line for diagonal space change	It is a movement line in which the voice actor and the person in charge of the Foley effect work together in the front and field spaces to create a diagonal space change.
㉗, ㉘, ㉙, ㉚	Movement lines for front/rear/left/right, diagonal space change	It is a movement line where the voice actor and the person in charge of the Foley effect work together in the front and field spaces to create an overall spatial change.

C. Directing the movement when producing a radio drama

When producing a radio drama, I looked at the current status of microphone settings, the function of the microphone, and the direction of movement using the space of the studio, but there are other specific matters for each country or situation.

It is about how to use the microphone according to the change of the scene and the movement line between the voice actor and the Foley effect for the driver's positional performance or the stereo. It is described in detail in Table-3

below.[19][20]

Table-3. Contents of special notes when producing a radio drama studio

div	special notes	Contents of special notes
①	Driving scene acting	In the scene of a conversation in a car in Korea, the driver must use the left microphone to be correct. This is because Korean and American cars have a steering wheel on the left. In the UK and Japan, the driver's seat is on the right, so when expressing the driver's seat, the opposite is expressed.
②	Acting with great props	Since radio dramas are produced in stereo, the voice actors must move back and forth while keeping a sense of distance from the same position according to the direction of the door, which is the main tool of the poly effect.
③	Scene change	Even though the scene has changed and the location has changed during the production of a radio drama if the character in the previous scene appears as it is, the position of the voice actor is changed based on the left and right microphones.

IV. CONCLUSIONS

Radio drama is a genre that allows listeners to hear, understand, and be moved by stories made only with sound, and we are studying stereoscopic and various methods for listeners. This is because, in order for the listeners to hear the storytelling delivered by the radio drama realistically, be moved, and accept it naturally, it is necessary to help the listener to be able to imagine better. In order to help listeners' imagination, the story created by sound must be stereoscopicized. The stereoscopicization of radio drama is the use of space and the expression of dynamic movement. For the use of space, the setting of the microphone in the radio drama production studio is important, and the dynamic movement of the voice actor and the Foley effect man around the microphone brings important results. As a result of the research, it was found that the radio drama studio should be spacious enough, the number of microphones should be large, and the output for space utilization is also important. In order to describe the sense of distance, the study was based on the acoustic characteristic, the preceding sound effect, that is, the Haas effect. In order to describe the sense of direction through left and right stereos, a study was conducted based on the head shadow effect among acoustic characteristics. In order to create a stereoscopic sense of space, we studied based on the binaural phenomenon using multi-track and multi-speakers. For the stereoscopic sensibility of such radio dramas, we analyzed and studied the floor plan of RS-15, a studio for producing KBS radio dramas in Korea. Like the method produced by KBS Radio Drama Studio, the studio should be divided into a voice actor's acting space and a field-effect space of a Foley effect, and appropriate microphones should be placed, and a stereoscopic radio drama based on the microphone should be produced to enhance the listener's sensibility.

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