

Sound Effects for Live Theatre*

John Sauter[†]

2020-06-17

Abstract

How to produce sound effects for live theatrical performances on a small budget, for example for a Community Theatre production.

Keywords: Sound Effects, Community Theatre.

*Copyright © 2020 by John Sauter. This paper is made available under a Creative Commons Attribution-ShareAlike 4.0 International License. You can read a human-readable summary of the license at <https://creativecommons.org/licenses/by-sa/4.0>, which contains a link to the full text of the license. See also section 7 of this paper.

[†]System Eyes Computer Store, 20A Northwest Blvd. Ste 345, Nashua, NH 03063-4066, e-mail: John_Sauter@systemeyescomputerstore.com, telephone: (603) 424-1188

1 Purpose of Sound Effects

The purpose of sound effects is to assist in telling the story. That story is told mostly by the actors on the stage, augmented by the costumes, props and scenery. Just as the scenery should not draw the audience's attention away from the story, neither should the sound effects.

2 Why Use a Computer

Low-budget live musical theatre provides its non-professional singers with microphones so they can be heard over the orchestra by the audience. Even non-musicals generally need microphones for actors unless the theater is very small or has excellent acoustics. The audio mixer, speakers and amplifiers needed for sound reinforcement can also be used for sound effects.

In the simplest cases, adding a source of recorded sound, such as a CD player, with the sound effects as "songs" on the player, will be enough. This is adequate for background sounds, but the timing of a music player is not precise enough for a spot sound, such as a slap. In some cases these spot sounds can be made by the actors or a backstage person using objects, but for others, such as a gun shot, this is undesirable. In addition, background sounds are severely constrained: if an automobile must start its engine in response to a cue while the urban background sounds are playing, you need a second CD player.

Computers have become inexpensive enough in recent years that it is reasonable to consider using one in place of the CD players during a live performance. With suitable software, a computer can play both background and spot sounds, and mix them together as needed.

I will use an example to illustrate how to use the `sound_effects_player` component of the `show_control` project to produce the sounds needed for a live musical theatre production.

3 What You Will Need

To run the `sound_effects_player` you will need a computer running the Fedora distribution of GNU/Linux. The computer must also have a sound card so it can output sound. `Sound_effects_player` supports up to eight channels of sound, but two are usually enough for Community Theatre productions. If you need more, USB sound players are not very expensive.

To get the `sound_effects_player` software, download the source tarball from github. It is a component of the `show_control` project, at this URL: https://github.com/ShowControl/sound_effects_player. `Sound_effects_player` also requires `libtime`, another component of `show_control`. Details are in the `.spec` file. Alternatively, you can install the `sound_effects_player` from COPR under the name `johnsauter / sound_effects_player`.

Once you have the software installed you can look at the sample configuration, the documentation and the first three examples to learn about the mechanics of the

sound_effects_player and see how to make simple sounds. In this paper I will assume that you have looked at that information so I will concentrate on the high-level design of the sound effects for a live performance.

4 A Show with Complex Sound Effects

Let us suppose that you have been asked to provide the sound effects for a show with a challenging set of sound effects: *Children of Eden* by Stephen Schwartz and John Caird.

In addition to the usual pre-show music and environment sounds during each scene, there are also a variety of spot sounds that must be played when an on-stage action happens. In addition, the director has challenged you to provide sound from both the front and back of the audience, and has loaned you the speakers from his home sound system to make this possible. This includes a subwoofer that will be useful for the thunder.

The XML files developed in this paper are included with the distribution of the sound_effects_player as example 4.

In order to make sounds come from behind the audience you have positioned two self-powered speakers on stands at the back of the theater along with the usual two at the front. The subwoofer is under the stage, concealed from the audience by a cloth drop from the front of the stage.

The music will be live but the actors are not professional singers, so we will use body microphones on the actors so they can be heard over the music. These microphones go through the audio mixer and the sound is sent equally to the two front speakers, so it seems to the audience that it is coming from the center of the stage.

The sound effects enter five channels of the audio mixer from the computer running sound_effects_player. In order to get five sound channels out of the computer you might need to use a USB sound device such as the M-Audio Fast Track Ultra 8R or the much newer StarTech 7.1 USB Audio Adapter Sound Card with SPDIF Digital Audio. You won't need a new sound output device, of course, if your computer can already drive a 5.1 surround sound system. The audio mixer routes the five sound channels from the computer directly to the five speakers. If you are using a 5.1 surround sound output from the computer, the Front Center channel will be unused.

We wish to provide an easy-to-use interface for the sound effects operator, so we will divide the show into discrete parts, and present him with only the controls he needs in each part. Theatre tradition divides shows into acts and scenes, but *Children of Eden* has no scene markers, so we will make up our own based on changes in the depicted location. In addition, we also need some sounds before the first act and after the last.

I do not have permission from the owners of the copyright on *Children of Eden* to post the script here, so I will ask you to purchase a copy of the script from Music Theater International at this URL: <https://www.mtishows.com/children-of-eden> so you can follow along as I go through the script looking for places that sound effects can help to tell the story. When you are creating sound effects for your own show you will have a copy of the script as part of the right to produce the play. Be sure to talk to

the director, in case he has some sound effects in mind.

4.1 Before the House Opens

You will want to test the sound system. Before the house opens is the best time to fix any cable failures or wiring errors. This needn't be complex: a single sound that identifies all five speakers in turn should be enough. I have used a track called "6-channel ID" which identifies all of the speakers in a 5.1 surround sound system. You won't hear the front center speaker; or if you do something is wired wrong.

4.2 House is Open

Play a medley of music from the play, perhaps recorded during rehearsal. To avoid copyright issues with this paper, I have used a nice public-domain song in example 4. You won't have a copyright problem because as part of the right to produce your play you have a right to play the music for your audience.

4.3 Almost Ready for Curtain

Your theater will probably want to make a safety announcement. This might be done live by the management, but in case it isn't offer the sound effects operator a choice of announcements to play. I have included in example 4 the announcements used at the Souhegan High School in Amherst, NH, where I did the sound for the Amherst PTA production of *Children of Eden* in 2010. There are announcements for Morning, Evening and Afternoon performances. The Afternoon and Evening versions have short, long and long humorous versions, whereas Morning has only short. You should record a voice familiar to your audience making the announcements.

4.4 Act 01 Scene 01 Page 001: Creation

The play starts in the dark, before the Earth was created. It isn't at all clear what sounds would convey this to the audience, so we'll just have silence.

4.5 Act 01 Scene 02 Page 007: Garden of Eden

The Garden of Eden should sound like a garden full of mammals, birds, insects and reptiles for Adam to name. They should be very soft until page 15, when they present themselves to Adam. We want a sound different from the silence of the void, but not loud enough to distract the audience from the story.

4.5.1 Act 01 Scene 02 Page 015: Animals Appear

As the animals arrive their sounds become more noticable until Father starts to sing. The director will probably not want a sound effect for this, but you never know.

4.5.2 Act 01 Scene 02 Page 024: Tree of Knowledge

The tree is said to be near a waterfall, so we can add the sound of running water. However, it is later depicted as also being in the part of the garden where Adam and Eve live, so perhaps the running water isn't needed, or maybe it should always be present. It is easier to eliminate a sound than to add one at the last minute, so we will have this sound available, and not use it if the director doesn't want it.

I created the water sound in example 4 by obtaining four stereo recordings of flowing water, and assigning them to each pair of speakers around the room: front, rear, left and right. Each speaker thus gets two channels. The four stereo recordings are of different lengths, so as they repeat the audience doesn't hear the same sound every few seconds.

4.5.3 Act 01 Scene 02 Page 033a: Eve Bites the Apple

As Eve bites, make the sound of an apple being bitten into.

4.5.4 Act 01 Scene 02 Page 033b: Eve Departs

Eve walks off through the garden so we can end the sound of running water. Pressing any of the Stop buttons marked "Water" stops all of them, leaving one Start button active.

4.5.5 Act 01 Scene 02 Page 040: Adam Bites the Apple

Make the apple biting sound again.

4.5.6 Act 01 Scene 02 page 042: Thunder and Lightning

After Father says "forever will it burn!" there is a terrific crash of thunder as a bolt of lightning strikes the Tree of Knowledge. This should be loud. Use all four speakers to good effect starting with those at the front. I used Audacity to move the sound from front to rear. In addition, to enhance the bass I filtered a monophonic version of the sound to eliminate all frequencies over 100 Hz and fed that to the LFE1 speaker, under the stage. The Audacity project is in example 4 under Weather.

4.6 Act 01 Scene 03 Page 043: The Wasteland

We transition to a new scene, where the background sound is not of a garden but of a wasteland. There is a waterfall nearby, so we will also have the sound of running water, as we did in the Garden of Eden.

4.6.1 Act 01 Scene 03 Page 044: Birth of Cain and Abel

Use the cry of a newborn baby for each birth.

4.6.2 Act 01 Scene 03 Page 061: Eve slaps Cain

The slap is a spot sound.

4.6.3 Act 01 Scene 03 Page 062: Circle of Giant Standing Stones

To convey that this is a different place the wasteland sound should be different, perhaps with more life in it. Perhaps we can add some of the garden.

4.6.4 Act 01 Scene 03 Page 065: Distant Rumble of Thunder

Use the rear speakers only, to convey that the thunder is distant.

4.6.5 Act 01 Scene 03 Page 069: Adam Strikes Cain

We can use the same slap as when Eve slapped Cain, though louder.

4.6.6 Act 01 Scene 03 Page 070: Adam Strikes Cain Again

Again use the same slap.

4.6.7 Act 01 Scene 03 Page 071: Cain Kills Abel

Use a different sound for the blows that Cain strikes.

4.7 Act 01 Scene 04 Page 072: The Mark of Cain

As Adam and Eve exit with Abel's body, we transition to a new scene. The background sounds are wind and rain which slowly fade in. When Father first calls out to Cain there is thunder from all four speakers, but it ends just before Father calls out a second time.

4.7.1 Act 01 Scene 04 Page 073: Cain is Marked

When Father and Storytellers sing "the race of Cain must ever bear this mark!" there is immediately a flash of lightning and a loud crash of thunder. I know that thunder is supposed to follow lightning, but I did not want to wait for the lighting guys so I told them that I had rehearsed the thunder and knew just when it should sound, and they should do their best to keep up. When Cain exits and Eve enters we transition to a new scene, back in the wilderness. The wind and rain fade out for five seconds.

4.8 Act 01 Scene 05 Page 073: Eve Enters

Use the same wilderness background as for scene 3.

4.9 Intermission

There is no background sound during intermission, but at its end there is an optional safety announcement as the audience is taking their seats. I have included the one from the Souhegan High School in Amherst, NH.

4.10 Act 02 Scene 01 Page 081: Generations of Adam

The background should be of a nice place, with a hint of a distant stream and the occasional insect. It is not as alive as the garden, but not as dead as the wasteland.

4.10.1 Act 02 Scene 01 Page 91: Noah Pounds

Thud as Noah pounds in the last peg of gopher wood. This is probably better done live.

4.10.2 Act 02 Scene 01 Page 101: Animals Appear

Each animal has an introductory sound: bunnies, turtles, chimps, panthers, birds, frogs, mike, zebras, ostriches, giraffes and elephants. Since their order is well-defined, we can present each to the sound effects operator when the previous one has completed. This lets us use the same button for each sound—the sound effects operator just presses “Start” when the next animal appears.

4.10.3 Act 02 Scene 01 Page 103: Thunder

As Yonah sings “thunder”, put a distant rumble of thunder in the rear speakers. As the end of the verse, do a closer rumble. At the end of the next verse, after “profane” another thunder. After “let it rain” thunder again to cue Japheth.

4.10.4 Act 02 Scene 01 Page 107: Thunder

As Japheth and Yonah kiss, there is a close rumble of thunder. Use all four speakers, though mostly in the rear. When Japheth says “come on!” there is a louder and closer thunder clap. Use front and rear speakers equally.

4.11 Act 02 Scene 02 page 108: Rain

The rain starts, mostly in the front speakers. This starts a new scene.

4.11.1 Act 02 Scene 02 Page 109: Thunder

On “Hurricane” the rain starts. After “forever will it rain” there is a flash of lightning and a big clap of thunder. Start it in the rear speakers and move it quickly to the front. After “and now I feel so old” there is another thunder.

4.12 Act 02 Scene 03 Page 110: On the Deck of the Ark

There is rain falling onto the gopher-wood ark. The rain is mostly in the front speakers. There is also wind, using all four speakers.

4.12.1 Act 02 Scene 03 Page 114: Bird Call

There is a bird sound from a birdcage. Put this in the speaker closest to the birdcage.

4.12.2 Act 02 Scene 03 Page 116: Commotion of People and Animals

Use the front speakers only.

4.12.3 Act 02 Scene 03 Page 118: Noah Strikes Japheth

Use the same slap as in act 1 when Adam struck Cain.

4.12.4 Act 02 Scene 03 Page 119: Noah Strikes Japheth Again

Use the same sound as in act 1 when Adam fights Cain. When Yonah says “No!” stop the wind.

4.12.5 Act 02 Scene 03 page 118: Noah Bangs Staff

This is probably better done live.

4.12.6 Act 02 Scene 03 Page 126: Rain Fades

When Japheth says “Look!”, start to fade the rain. The release time should be 15 seconds, so the rain is gone by the time Mama says “An olive tree.”.

4.13 Act 02 Scene 04 Page 130: Back on Land

This scene is “early one morning a few weeks later”. Use the same background sound as for scene 1.

4.14 After the Show

When the last curtain has fallen, play some nice music as the audience is leaving.

5 Try it

You can experience the show from the point of view of the sound effects operator by running example 4 from `sound_effects_player`.

6 Acknowledgments

7 Licensing

As noted on the first page, this paper is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

The full text of the Creative Commons Attribution-ShareAlike 4.0 International license is at this web site: <https://creativecommons.org/licenses/by-sa/4.0/legalcode>, and is embedded in this PDF file. What follows is a human-readable summary of it.

7.1 You are free to:

Share — copy and redistribute the material in any medium or format, and

Adapt — remix, transform, and build upon the material

for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms.

7.2 Under the following terms:

Attribution — You must give appropriate credit,¹ provide a link to the license, and indicate if changes were made.² You may do so in any reasonable manner, but not in any that suggests the licensor endorses you or your use.

ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license³ as the original.

No additional restrictions — You may not apply legal terms or technological measures⁴ that legally restrict others from doing anything the license permits.

7.3 Notices:

- You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an exception or limitation.
- No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy or moral rights may limit how you use the material.

¹If supplied, you must provide the name of the creator and attribution parties, a copyright notice, a license notice, a disclaimer notice, and a link to the material.

²You must indicate if you modified the material and retain an indication of previous modifications.

³You may also use any of the licenses listed as compatible at the following web site: <https://creativecommons.org/compatiblelicenses>

⁴The license prohibits application of effective technological measures, defined with reference to Article 11 of the WIPO Copyright Treaty.