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Independent Study

A Sound Designer's Toolbox: *never again will I press play!*

My independent study focused on the creation of various modular computer-based sound design tools. The goal of these tools was to be able to quickly and dynamically design sound. I use the broadest sense of the word 'design' in the context of sound, to incorporate sound effects, spatialization, foley, soundscape, gesture, music, etc. And I use the word 'design' as opposed to 'composition' because these tools are focused on designing sonic environments quickly and dramatically in a live rehearsal or production environment. That is not to say that the tools could not be used for composition or live performance, but that is not their primary goal.

The creation of this toolbox is not complete. It is an ongoing creation/collection process. I use a combination of commercial software and custom-made Max/MSP patches as well as input from instruments, voice or other external sources, sonic or otherwise. The organization of my sound design 'rig' in terms of networking and hardware is also important, as its construct can limit or expand possibilities. For my independent study I have taken the time to really think about the basic elements in designing sound, being able to create example sounds and sound design in real-time, as well as developing dynamic sound processing and synthesis tools.

1. SOFTWARE

The commercial software that I use is Ableton Live and a variety of plugins. I do not wish too comment on the commercial software that I use other than to say that Ableton Live's usefulness and capabilities are well documented (www.ableton.com) and my choice of commercial plugins is varied and personal. It is akin to a pianist saying that he or she plays a Yamaha piano or a Steinway. They are both good pianos. What I will write about is how I use them. This is incorporated into the writing below.

I use Max/MSP for patches created by others and to create my own personalized patches. I also use Max/MSP to create dynamism in the commercial software (e.g. creating randomness, or algorithms that control parameters in a plugin that does not have it built in)

I have included some example Max/MSP patches:

- (1) The 'template1 brainstorm' patch is an example of my first brainstorm into the idea of quickly and dynamically creating a broad sound palette. Although it may be impossible for anyone else to understand by looking at it, I can create subtle to complex sounds, rich sonic density and constantly changing sounds. It is very rough and idiosyncratic, but it was used successfully in the production *Cross Dream Traffic* along with other patches and software. This patch was mostly used to create various dense soundscapes and sound effects. I have also successfully used this patch in improvised performance contexts with other musicians and poets. This adaptability is the beginning of what I am hoping for in the creation of these tools.

“Chilly.wav” and “I got a cold excerpt.wav” are two sound examples made with the above patch. Please see <http://www.sarc.qub.ac.uk/~elyon/DATA/CDT/> to listen to recordings of *Cross Dream Traffic*. Of particular interest would be the opening and closing sections where this patch was used heavily along side three other musicians.

- (2) The 'template2 sketch' patch is the beginning of a second stage patch based on 'template1 brainstorm'. By looking at it you can see that it is somewhat better organized and there is the beginning of modularity in subpatches like: [p filter], [p flangeV], [p sampler1], [p randomNumber], etc. This is very similar to many commercial object-oriented software for sound generation such as AudioMulch or Reaktor where objects do specific things like reverberation, delay, flange, etc. There are a couple of important differences: one is that they are personalized. For example, I made a delay poly~ (see: 'randomdelay' and 'randomtap') that incorporates delays of one sample up to many seconds. I can control the amount of delays and whether they should be evenly spaced or not. It still needs improvement and plugins like 'GRM Tools Delays' has many similar and better capabilities. However, the control of the randomness is the core difference. I want to be able to play with complex dynamic randomness, interactivity at the micro and macro level of sound, interpolating data in a matrix-like way. In using a commercial software I will always be compromising or trying to create 'work-arounds'. With personalized software I can simply change it.

[p interactiveEXAMPLE] is a basic example of how I can quickly create an interaction between an audio input (e.g. an actor's voice, instrument, ambient sound, contact mic, etc.) and an effect. This shows how quickly I can create dynamism and interactivity in a sound with little more than the connecting of a patch chord. In a rehearsal process this is a quick way to give a director or collaborators an idea of what is possible which could then lead to the creation of something more complex or integrated. With this patch, I can quickly try out ideas and hear them.

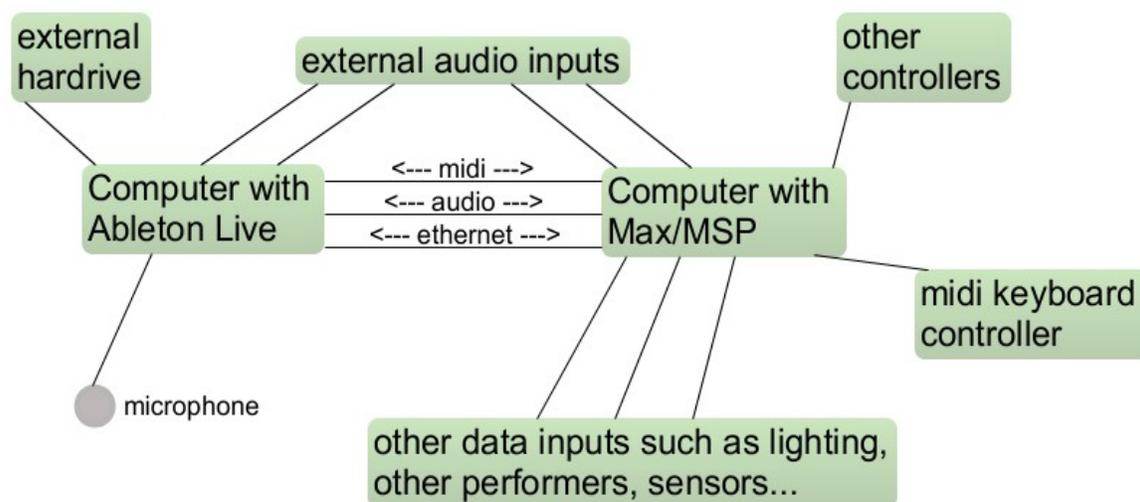
[p distortCONTROL] is an example of how I can use Max/MSP to create small random changes in an effect so it is never the same. In this case, I was using it to control parameters of a distortion effect in Ableton Live via midi.

Halfway through the creation of this patch I ran into routing problems and finally I had to abandon it, as I wanted to tackle the organizational problems in a different way. The [p output routing] looks nice, but is too limited. It is not possible to route audio out of and back into the matrix~ object. I want to be able to have any sound and/or sound effect routed to any sound and/or sound effect and it is not possible to do this with the matrix~ object. Also, I do not wish to only route sound. This is one of the most powerful features of Max/MSP. For example, I may want to send a sound into a sound effect, have the same sound's amplitude

data control a parameter of another effect, it's frequency data above 1000Hz control a lighting console and the ambient light in the space effect the amount of blue in a video image. These are the types of routing challenges I am tackling. Therefore, I have to rethink how to do the routing. I am looking into using javascript, jitter or simply send(~) and receive(~) objects.

2. HARDWARE 'RIG'

I usually use two computers but the concept is the same for one. I have Ableton Live (which includes all my commercial plugins) on one computer, and Max/MSP on the other. Then, I create a midi/audio/ethernet network so that midi data, audio data, and any data that can be sent over an ethernet network (I use firewire for its speed and reliability) can be sent in either direction; a matrix. I have an extensive sound effect library on an external hard-drive connected to one computer that can be accessed by both (If I am doing any heavy processing or sampling on a file from the library on the computer that is not connected directly to the external hard-drive, but I usually drag it to the local computer for reliability). I use a midi keyboard controller and/or many other devices depending on their availability. I use at least one microphone input for my personal use (e.g. record/sample vocal sounds, record/sample instruments or objects that I play, record/sample the ambient sound of the space). There could be more inputs depending on the context (e.g. musicians, actor's voice, ambient sound, another sound designer's sound, etc.).



3. THOUGHTS

I have been thinking about what is important in the designing of sound design tools. There are three basic questions: What are the sounds a sound designer wants to/needs to make? How does a sound designer make them? How can a sound designer make these sounds (or rudimentary versions of them) in real-time?

3.1 What are the sounds a sound designer wants to/needs to make/design/collect?

The sounds a sound designer needs to make/design/collect are extremely broad and I think of them as existing on a continuum from sound to music. Sound, at its extreme of the continuum, is sound as it is heard in its natural or 'real' environment: sound effects, foley, atmosphere, rain, city

ambience, footsteps, explosions, a car going past, etc. Music, at its extreme of the continuum, is music in its most classical definition: tonality, atonality harmony, dissonance, tension, build, release, shape, dynamism, density, space, rhythm, syncopation, 'in-time' or synchronization, chaos, order, gesture... (I don't want to argue a definition of music here! I trust the concept I am trying to get across is clear.)

The sounds I want to make as a sound designer lie at the middle of the continuum where it is not always clear whether it is sound or music, as it is both. Then, according to the necessities of the sound design one can push more towards sound or more towards music.

Some examples: instruments that are set pieces/set pieces that are instruments, comb filtering ambience, a phone ring in tune with the background music, a car slam in time with a rhythm, convolution, an unamplified voice transforms into a distorted recorded voice, a scream turns into a train whistle, a train whistle turns into a scream, etc.

A further example: an actor's scream, turns into a recorded opera singer's voice, turns into train whistle, splits into spectral wonders, turns into noise gestures, filtered into a hint of harmony, turns into a hint of a Gm7 chord, which leads to the opening chord of concerto no. 5 by so-and-so, played by a pianist and ensemble, accompanied by actors singing...etc...all of the above not necessarily happening in linear or sequential order, layers, combinations, spaces, gaps, collisions, support...

3.2 How does a sound designer make these sounds?

This question was discussed quite a bit in the descriptions of my software and hardware setup. I won't repeat what I stated above but I would like to stress that the sounds I am interested in making are sounds that are never the same. I never want to press 'play' and have the 'rain sound' come out of various speakers. It may be easier to do that, but with current technology, we can take our sound designs to another level by making some sort of random rain generation patch, or having the rain go through an effect that subtly and continually changes its spectral content, etc.

The sound designer has to make/find/borrow/steal software/instruments/musicians/recordings/effects/synthesis then use blending, layering, convolving, complexity, integration, random/quasi-random subtle/not subtle changes, algorithms... never the same, never press play.

3.3 How can a sound designer make these sounds (or rudimentary versions of them) in real-time?

Again, this was discussed in the description of the software and hardware setup above.

4. SPATIALIZATION

I also applied ideas related to the above to the development of a spatializer that can place any number of sounds in any speaker and pan between them using a midi keyboard. This is something that is complete in a beta 0.1 form. It includes the ability to pan to and from any one or all speakers (24 maximum in example patch but it is easily expandable or shrinkable), change the panning speed, record trajectories, playback all or parts of trajectories at variable speeds, randomization (not displayed in 'pianopanner').

(see example Max/MSP patch 'pianopanner'. The example patch works on a single computer. I have made a beta 0.2 patch ('pianopanHOST', 'pianopanCLIENT') that incorporates randomization and is designed to be used with a client and a host where the host computer is used for spatializing and the client computer(s) control the spatializing. This is more versatile because it is easier to add computers and midi keyboard controllers.)

5. CONCLUDING COMMENTS

My involvement with *Cross Dream Traffic* was a big part of my independent study. I was able to try out ideas and to learn from the people I was collaborating with in an intense production environment. This was invaluable.

To sum up the above ideas into one sentence: "I never want to press play again". This approach to sound design creates richer sonic environments and more dynamic collaborative possibilities with non-musicians and musicians unfamiliar with the possibilities of contemporary electroacoustics, sampling, spatialization, algorithmic composition, etc.

5. READING RELATED OR OTHERWISE

I did a variety of reading about movement and sound design.

My reading list included:

Laban for Actors and Dancers by Jean Newlove

Periphonic Sound Spatialization in Multi-User Virtual Environments by Florian Hollerweger

A Sample Accurate Triggering System for Pd and Max/MSP by Eric Lyon

Shaping Sounds in York Minster by Filipe Otondo

Dance Studies No. 1 and 2 (2005/2006) excerpt of portfolio by Filipe Otondo

Devising Dance and Music by Leigh Landy and Evelyn Jamieson

<http://www.musicandmeaning.net/issues/showArticle.php?artID=2.6>

<http://www.mti.dmu.ac.uk/~llandy/dance.html>

<http://www.listenhear.co.uk/prague.htm>

<http://www.digitalartists handbook.org/sound>

<http://synesthesie.com/heterophonies/theories.html> various articles