The Chopping Board: Real-time Sample Editor

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ABSTRACT
"Chopping" is a compositional technique used by many hip-hop producers and other artists working with audio samples. This technique involves separating a sample into smaller segments and re-sequencing them into a new composition. The Chopping Board is a composition and performance tool designed specifically for this technique. It is meant to inject some of the elements of traditional musicianship into sample–based music.

Keywords
Hip-hop, sampling, musical interface, gesture, plunderphonics, mash-up

1.INTRODUCTION

1.1Background
As a hip-hop producer and DJ, my music is primarily sample based. My compositions are comprised of small audio snippets from previously recorded music. This is a very common practice among producers working in hip-hop, as well as other forms of music. Chopping a sample came about because of necessity, and as a logical progression. In the early 90's when copyright laws became strict, hip-hop artists had to devise new methods in order to avoid legal repercussions. By chopping a sample, it becomes a lot harder to recognize and thus a lot harder to prove what the source is. It also allows for more flexibility in terms of arrangement and tempo. A looped sample is restricted to the original tempo and arrangement whereas a chopped sample is not. Some feel that chopping is a more creative way to approach to sampling. By re-arranging the sample, the producer is adding or building on the original. The original sample is not being used verbatim.

The use of pre-recorded music to create compositions is a fairly popular technique that spans multiple genres. The introduction of the Fairlight CMI and other digital samplers in the early 1980's made it possible to easily replicate and manipulate digital samples. Pop groups like Art of Noise and Malcolm McLaren all used samples prominently in their music. Hip hop producers gravitated towards sampling as a logical extension of their turntable based music. Around the same time, other artists were doing similar work. Christian Marclay used records and turntables to make installations and sound collages. The legal ramifications of sampling have also made it a subject of discussion. Works like Danger Mouse's "The Grey Album" have brought sampling and copyright infringement to the forefront of pop culture. The artistic merit of sampling is often debated as well. John Oswald's "Plunderphonics" and Gideon D'Arcangelo's "Recycling Music" both offer interesting arguments in favor of sampling and general re-use of music.

1.2Reasons For Sampling
Some may be curious as to what the purpose of going through this process is when one could simply re-play the desired sample. Part of the appeal of sampling is that you can capture the production sound of an era of recording that no longer exists. Sampling enthusiasts feel that the music of the 60's and 70's "sounds" better than current recordings due to it's use of analog equipment. Many feel that the recordings of this time have more "warmth" and "grit". Another appeal of samples is its use of what I like to call "accidental sound". Lets say our source sample is chopped into four notes, "a", "b", "c", and "d". It is quite possible that at the tail end of the "c" sample there is a scream from a band member, or some other kind of ambient sound. Every time the "c" is triggered, the scream will play as well. If it is triggered frequently, the scream will take on a percussive quality. If the new composition is at a different tempo, the scream may be slightly off beat, but it may add a unique swing to the rhythm. The scream finds it's way into the composition by accident. But it will add an element to composition that would probably not exist otherwise. These situations arise frequently when working with samples. Sometimes they can add a great deal to the composition.

1.3Problems with Sampling
Sometimes, working with samples can feel more programmatic than musical. A fair amount of editing and prep work must be done before one can begin composing. This process can be time-consuming and cumbersome. It is possible that after all the editing is done, one might decide that the sample is unsuitable. This prep work may even prevent certain musical experimentation. Because the music is made using some kind of sequencing program, rigidity and precision are a part of its nature. After it is sequenced, the piece will never be off beat. To some, this is a blessing. However, I cannot help but think that hip-hop and electronic music production could benefit from some of what I am calling "human factors". Live musicians add subtle nuances to music, which can contribute greatly to a song. Musicians interact with the music, as well as the people around them. This idea of the "human element" is part of what makes music

exciting. Some, if not most of this, gets lost in electronic music.

2.THE CHOPPING BOARD

The Chopping Board is an interface designed specifically for composition and performance using samples. It injects some of the characteristics of traditional musicianship into sample-based music. The Chopping Board maps a sample across a space approximately 18" long called the "editing pad". The editing pad is a physical representation of the sample, the left side being the beginning, the right side being the end. Wherever the editing pad is triggered, the sample will begin playback at the equivalent point in its timeline. The idea is that the user triggers various points of the sample in a musical fashion, in effect chopping the sample. There are also controls for volume, pitch, and sample selection.

One of the reasons that audiences watch and respect musicians is because they have developed skills that not all have. I hope that the Chopping Board will require some of these skills as well. For example, a guitar player must accurately and quickly position her fingers in order to play the right notes. With the Chopping Board, the player must memorize specific locations and trigger them accurately and quickly as well. I am hoping that it will parallel traditional instruments in their need for manual dexterity, timing and precision.

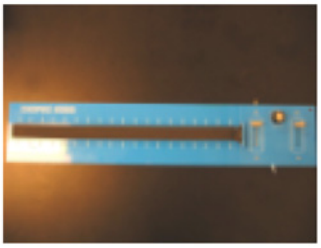

Figure 1. The Chopping Board

Like traditional instruments, and unlike most sample-based music, the Chopping Board is played live for the duration of a performance. The user must be able to play the part with precision for an extended amount of time. It is my hope that this will add some of the "human factors" that I discussed into sample-based music. Instead of playing back music from a pre-recorded format, the Chopping Board will allow some of the elements of the music to be played back live. This could be more engaging for audiences. It will allow for more musical improvisation and interaction as well. The user positions his or her self above the Chopping Board, much like you would when playing a vibraphone or a 12-string guitar. The instrument is played by touching various locations on the editing pad. The musician's interaction with the instrument is completely visible to the audience, allowing them to see the direct correlation between the musician, the gesture, the instrument, and the sound. The Chopping Board is also designed to streamline the technical process of sample-based composition. The producer no longer has to edit and prep the sample. As soon as the sample is loaded, the producer can begin to "chop". This will allow composers to work more quickly and intuitively. It will also allow for more experimentation.

3.TECHNICAL SPECIFICATIONS

The Chopping Board needs to measure the x-location of the users hand on the editing pad. Currently it uses a combination of an infrared sensor and a touch sensor to do this. The IR sensor is positioned on the right side of the editing pad. A touch senor spans the length of the editing pad. When the user touches the pad, the IR sensor takes a reading of the distance of users hand, which is directly in its path. This data is sent to a PIC microcontroller, where it is converted to MIDI data. The MIDI data is sent to a computer running a MAX/MSP patch. The audio is played back out of the sound card, into some kind of speaker or PA system. The MIDI protocol offers a resolution of 127, which seems fairly low, but I have not felt limitations in this respect. However, because of the combination of the IR and touch sensors, there is some noticeable latency in the audio playback.

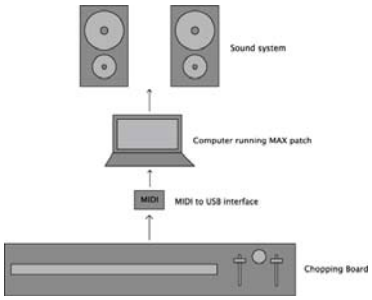

Figure 2. System layout

The Chopping Board has faders for both volume and pitch. There is a sample select knob, which sends commands to the MAX patch about which sample to load. There is a switch for toggling between "momentary" and "sustain" playback modes. In momentary mode, the sample will only play for as long as the editing pad is pressed. In sustain mode, the sample will play all the way through after being trigged. These modes are designed for various composition techniques. All of the data from these controls are sent to the PIC, and output as MIDI data. No audio signals flow through the Chopping Board.

Online documentation and a video demo for the Chopping Board can be found at: http://jasonwlee.com/chop.htm.

4.REFERENCES

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