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Working with Sound in the DAW

Towards a New Materiality of the Audio-Object

By Stace Constantinou

Introduction

Contemporary music production occurs at the junction of a series of relations between creator, software, and hardware. The combining of computer software and hardware used for digital music-making contained within a relatively small physical space gives rise to the Digital Audio Workstation (DAW). In recent years, the software element in this series of relations has increasingly become the central element, so much so that today it tends to be regarded as the DAW itself. Music production software does not, however, constitute a neutral field for free creative exploration. Rather, it includes a set of assumptions about the ways in which the creative user will work (Marrington, 2011). Such a set of assumptions arise within the user interface, the onscreen visualization of the ideas that underpin the software's workings, with each DAW having its own particular set of music production features that inevitably channel the efforts of creative users in particular directions. And in a competitive market, the DAW's user experience becomes an increasingly important factor, as companies strive to maximize profits by delivering software that is simple for the customer to use.

A significant aspect of contemporary music production concerns the manner in which recorded sounds are employed as material for creative endeavor. Audio recordings are often given visual onscreen objects that users edit and manipulate. These visual objects then

transmute into what I call the “audio-object”, as a result of the alignment of the visual and tactile interactions between user and equipment (mouse, tracker pad, MIDI controller, and so on). This alignment also encompasses the seemingly aural response of the audio-object, as the cursor or playline is seen, onscreen, moving over it. It may consequentially feel like this audio-object has an onscreen material presence, even though it does not. Instead, the onscreen object simply represents the materiality of the sound, which exists as an array of binary markings stored on a hard drive.

My purpose in this chapter is to reflect on the nature of the audio-object and the manner of its employment, within the DAW, providing specific reference to electronic music production practice. In particular, I wish to consider the way in which the relationships between sound and object may impact upon electronic music producers’ thinking about, and working with, audio as a material for creative use. This chapter draws on recorded interview material I collected between February 2017 and October 2018 , from a select group of electronic music producers currently working in the electronic music scene. These electronic music producers are Manni Dheensa aka Manni Dee; Ewa, Justka; Thimitris Kalligas aka Kalli; Shelley Parker: Alan Stones and Jesse Kuye aka Jesse Tijn. I have included salient passages from the aforementioned recorded interviews that underpin the trajectory of this chapter. As part of my conclusion, I suggest new ways of working with digital sound, using a refined series of interactions between the creative user, visualized objects, and the intrinsic creative potentiality of those onscreen “audio-objects”. In essence, what I propose is a new theoretical model for working with the audio-object within a speculative DAW, one that combines a free-flow creativity with touchscreen devices.

Technology and Musical Creativity: Sound as Material

Technology shapes the way in which music making occurs. For example, a singer’s relationship to the vocal mechanism is markedly different to the pianist’s relationship with the keyboard.

The very nature of a piano, or voice, necessarily means that a certain kind of idiomatic writing for that instrument can occur. If instrument technology shapes the way in which this idiomatic music making, and ideation, occurs, or can at least be said to have a minimal impact on the final creative result, there is reason to suppose that the computer is no different. As Hans-Joachim Braun explains,

> Technology has always been inseparable from the development of music. But in the twentieth century, a rapid acceleration took place: a new "machine music" came into existence, electronic musical instruments were developed and composers often turned into sound researchers.
>
> (Braun, 2000: 9)

The early basis of the computer in the mathematical and technical milieu of the scientist, consisting of a QWERTY keyboard, visual display unit (VDU), central processing unit (CPU), working memory (RAM), and storage (hard drive), initially meant that musicians needed to possess both technological skill and a keen sense of musicality. At the end of the 20th century, as the size of computers shrank, commercial manufacturing costs fell, and their power increased, the personal computer (PC) became a general commodity, in a consumer market, that could be used for a number of different purposes, including music making. Limitations in RAM size, processor speed, and storage meant, however, that the use of audio within PC music systems was more problematic than the use of MIDI, the latter requiring less data consumption than that of digital recording. As the common musician did not own a computer powerful enough to run multiple tracks of digital audio with simultaneous recording and playback, digital recording typically occurred away from the CPU, on hardware digital tape systems, such as the Alesis ADAT (Théberge, 1997: 246) or the Tascam DA-38 instead. Digital recording and production systems were also available as a type of keyboard sequencer, such as the "most expensive commercial digital synthesizers like the Fairlight [CMI Series II] and Synclavier (each of which was originally developed as a studio machine)" (Braun, 2002: 55).

Initially, recording multiple tracks of digital audio required a considerable financial investment in studio space, mixing console, recording, and other physical gear (Bartlett, 2001: 4–5). Multi-track digital-audio tape machines, such as the Alesis ADAT, for example, were specifically manufactured for the affordable end of the home studio music market, as, according to the manufacturer,

> 1991 proved to be the ground-breaking year for Alesis, with the introduction of the ADAT Multi-Channel Digital Tape Recorder. Before ADAT, a studio would have to invest $50,000 in order to afford a multi-track digital recorder. With ADAT, the price tag came down to $4,000, essentially allowing every home and project studio to afford digital recording. This new technology allowed any artist or musician to record studio quality recordings.
>
> (Alesis, 2018)

In time, such outboard devices as the ADAT became obsolete as computing power increased and the cost of recording directly onto a hard-drive fell. Importantly, computers also offered hardware that allowed for a non-linear digital recording, meaning that musicians became able to afford high-quality digital recording equipment, as well as utilize its onscreen user-friendly (or friendlier) software. Initially prohibitive to the ordinary musician in cost, by 1998, innovations such soundcards were an important part of the computer audio market and were being included as "free" items within the cost of a computer. A computer soundcard, the "Sound Blaster Live! EMU10K1 APU, 2M Transistors", was reputedly

> a game-changer. A new PCI audio chip was introduced in the market, which powered the Sound Blaster Live! The EMU10K1 APU, with two million transistors and unprecedented audio processing power and performance of 335 MIPS, blew away the competition. Another new audio platform, Environmental Audio eXtensions EAX application programmer's interface API was introduced in the market. Established as the new audio standard under Windows, the EAX API was made available in the industry for free.

(Soundblaster.com)

Today, the availability of affordable PCs, with their continuously increasing processing power and storage capacity, means that for many recording jobs, all that is required is a computer, an external audio interface, headphones, and microphone(s). A bigger recording space and multi-track device may still be needed for larger-scale drum recording, or ensemble sessions, but not for most overdubbing requirements, or mixing requirements, and likewise not for electronic music production. As a result, as Marrington (2016: 52) writes, "the Digital Audio Workstation (DAW) has established itself as the predominant technology for music creation and production".

Add to this the availability of vast sound libraries (pre-made material in the form of musical snippets ready for looping or editing), and it becomes clearly questionable whether one even needs to be able to play a musical instrument in the conventional sense. The PC is the instrument, so it is just a question of choosing the right sounds, as producer and DJ Jesse Kuye aka Jesse Tijn, in an interview with me, explains,

> Find sounds that don't need to be worked on from the beginning. If you hear a sound that you don't like a part of it, just don't use it, wait 'til you find a sound you like all of. And then you can bend it into what ever you like.

(Kuye, 2017)

It is important to note the interchangeability of different terms that refer to the audio-object. Jesse Tijn, for example, uses the term "sound" in the citation I reproduced here. Elsewhere, DJ and producer, Shelley Parker, uses the term "samples"; see the following text from the interview with me. Parker says,

> For the last three years, most of the sounds/music I make is from samples. I love having a load of recorded material and then tucking into it, working out how I'm going to use the samples.

(Parker, 2018)

My aim here is to locate a general, common, or umbrella term, like “audio-object”, to describe a variety of simultaneous practices, whereby digital recordings are the main material used in creative music production – for example, use of samples, loops, recordings, regions, “found sounds”, sound objects, and so on.

One way to begin understanding the audio-object is in terms of its intrinsic material properties. Different file formats are used as audio recordings creating digital material objects that exist on hard drives, as the result of different methods of encoding acoustical data, for example the standard Mac audio file format is AIFF (audio interchange file format), which is not data compressed, and can be compared to the MP3 (MPEG Level-1 Layer-3), which does compress the data, typically to around one-tenth of its original size (Bartlett, 2002). Arguably these different formats imbue the sound with different audio qualities. Producers may feel that there is a unique or specific sound quality that arises as a result of using a particular file format.

Electronic music producers can use digital file format features as a perceived or actual aesthetic medium for the creation of a particular type of electronic music. Andrew Burke, for example, explains, in his article *Trademark Ribbons of Gold: Format, Memory, and the Music of VHS Head*, how the producer VHS Head has a preference for audio material taken from VHS tapes (Burke, 2015 355):

> Comprised in large part of samples drawn from a collection of 1980s videocassettes layered over frenetic and fractured beats, the music of VHS Head points to the way in which memory and technology intersect. Occupying the space where glitchy electronica meets hypnogogic pop and futurist soul the tracks on VHS Head’s debut full-length album, Trademark Ribbons of Gold (2010), complete a trajectory from VCR to the mp3.
>
> (Burke, 2015 355)

Shelley Parker, too, draws inspiration partly from a combination of different media, including cassette tape:

> I've got a few hundred tapes, minidiscs, DATs, and digital recordings. 1996 is when I first started recording. I did lots of recordings in 1997 of an air vent in Kings Cross. I used to listen to a lot of music on tape, so I like that sound of C30s. There would always be that hiss but I liked it.
>
> (Parker, 2018)

The relative sound quality of an individual audio-object may also be important in order to produce a particular kind of desired end result, as electronic musician Thimitris Kalligas aka Kalli explained to me in an I interview in 2017:

> I've always had to like work on my samples and see what problems they have with them and make them more accessible for myself . . . If it's a high quality sample I can always mess it up. But there's more potential to mess it up. . . . If I'm using kick drums I'll look for something thuddy, something very organic sounding. I'm not really a big fan of using 808s, 909 drum samples . . . I put it through a lot of effect . . . chaining, and warping, which helps a lot.
>
> (Kalligas, 2017)

The Evolving Aesthetic of the Audio-Object

Making music from pre-recorded sounds, that is, using "samples", is a commonly recognized tenet of electronic music. The acceptability of this practice in the wider sphere of musical aesthetics was achieved only gradually, however. In the first part of the 20th century, for example, Pierre Schaeffer theorized about and worked with sound recordings to make musical compositions, a style he initially called "concrete music", and, later, "acousmatic" music (2012). Schaeffer used the term "sound object" to describe his samples, which he saw as a genuinely

new material for music composition. He then detailed his sound experiments, as well as a series of compositional techniques in a number of diary entries entitled “In Search of a Concrete Music” (2012). Later, he developed and presented a more detailed work titled “Traité des objets musicaux” (1966) “Treatise on Musical Objects: (2017), which ultimately moved a group of composers to, broadly speaking, work in the field of acousmatic music. One of the themes running through Schaeffer’s texts is the notion that sound composition may be considered in some sense akin to the science of acoustics. This view remains relevant even today, as can be seen in the comments of electronic musical instrument maker and performer Ewa Justka who says, in an interview with me,

> Sound has a form, a specific form. If you have an oscilloscope and plug that oscilloscope to the sound system you can see specific, I mean you can see the sound wave . . . sound is just a signal, it’s a voltage signal so you can translate it to anything to vibration, to light, erm you can plug it into an oscilloscope and see actual sound waves, it’s not really, yeah, it can be anything.
>
> (Justka, 2017)

Interestingly, Justka occupies a relatively uncommon space, insofar as she works without using computers in her live performance. Pre-performance, she prefers making her own setup of DIY electronic musical instruments, which she then “performs” live on stage. She continues, “It’s more about the process of making things. My work is about making things” (Justka, 2017). In Justka’s case, then, the primary object is the electronic music making machine itself, with the onscreen representation of the sound, the oscilloscope’s image being of secondary importance. It is worth noting perhaps that Justka’s live show includes lights that pulsate in time with the beat.

Another important aspect of working with audio-objects in the DAW concerns the application of digital signal processes (DSPs) to transform the sonic characteristics of sound. Such processes are often akin to practices familiar from the analogue era of production – for

example, the transformation of the sound of an electric guitar using distortion or the modification of a vocal part using echo, delay, and reverberation. This allows for the creative manipulation of audio-objects into new and potentially novel types of sound. DSP transformation of audio-objects is ingrained in the process of electronic music production, as Kalli explains,

> Most of my music is manipulated sounds. Probably one hundred per cent of it is manipulated samples . . . turning things into what they shouldn't be, or just trying to escape . . . say I've just turned the sound of a train going past and I can manipulate that into anything.
>
> (Kalligas, 2017)

Recreating hardware equipment (such as a mixing console for example) in music production software that simulates the operations and sonic characteristics of earlier forms of technology means that pre-existing physical modes of operation (moving faders up and down say) continue but in the onscreen paradigm of the computer user interface. This method, of recreating hardware equipment in software, is described as "skeuomorphism" by Adam Bell, Ethan Hein, and Jarrod Ratcliffe in their joint article "Beyond Skeuomorphism: The Evolution of Music Production Software User Interface Metaphors." Working with a physical mixing console involves kinetically moving faders and dials whose positions are relatively fixed, ergonomically. In contrast, the experience of interacting with DAW software relies on mouse, or touchpad kinesthetic movements that relate touch to the onscreen visualization and then the resulting aural outcome. Skeuomorphism is therefore an attempt by software developers to reproduce in the computer a digital form of an earlier hardware production practice/s associated with older technologies (Bell et al., 2015).

The way in which audio-objects are contextualized within the broader environment of the DAW is also of significance. For example, the common DAW-based paradigm for the visualization of audio-objects is the linear sequencer that charts time from left to right (see

Logic X, Cubase, and Sonar, for example). This defaults to an onscreen grid, with vertical lines denoting the passing of clock/ metronomic musical time, the latter defaulting to a 4/4 time signature. Both audio- and MIDI-objects (both termed regions by the software manufacturers) are then easily visually aligned to this grid. A stack of audio- and MIDI-channels are used, most commonly, with each channel being aligned to a separate sound, so it can be more easily isolated during mix down. Quite commonly, perhaps, this is achieved using the "mix window", an onscreen reminiscent of a hardware mixing console. Transformations of the sound then typically happen as a result of inserts being applied to each channel-strip with more control being applied using automation of its parameters. Such inserts typically assign DSPs, such as equalization (EQ), followed by compression, and reverberation perhaps. Each insert may be turned on or off, as well as have their parameters altered in real-time, a process known as automation. This combines, therefore, the linear paradigm of the digital tape recorder with the left-to-right music reading practice of standard notation.

A DAW such as Ableton Live, in contrast, is distinctive in that it allows for the pre-selection and uploading of multiple audio-objects onto a single channel-strip. In addition, each loop can be easily turned on or off at will by the electronic music producer, or DJ, in real-time. This difference in the spatial hierarchy of audio-object utilization gives Ableton a live performance functionality, a key feature of its appeal. Traditional time-based paradigms are still present, however, in that the audio-objects are, by default, set to trigger according to a seemingly ever-present, rigidly metronomic, 4/4 beat. Each sample is also automatically shortened or lengthened so it fits in with the beat, unless explicitly programmed to do otherwise.

DAWs, such as Logic X and Ableton, both carry vestiges of analogue ways of working (e.g., the channel-strip) combined with a, not essential but nonetheless telling, grid-time 4/4 beat. New ways of working with sound may come about by accident, or they may be sought. To seek a new way of working, one may employ either theory to rejuvenate the thinking process or

embark on an experimental method, hoping that serendipity will strike. One could employ both methods perhaps, as Schaeffer did.

Theorizing the Audio-Object

In his book *Traité des objets musicaux*, Schaeffer considers the "sound object" (the analogue forerunner of today's digital audio-object) in these terms:

> This unit of sound [sound-object] is the equivalent to a unit of breath or articulation, a unit of instrumental gesture. The sound object is therefore an acoustic action and intention of listening.[1]
>
> (Schaeffer, 2002: 271)

Schaeffer was working with analogue, magnetic tape, as the means by which to record and store his sound objects, thus his experience of sound-as-object will have been similar but subtly different to that of contemporary producers using audio-objects within the DAW. In a DAW, as already mentioned, a way of imagining an audio-object is as a time-domain (oscilloscope) visualization. This emphasizes the amplitude of sound waves as they transform through various compression and rarefication states. This visualization becomes an onscreen object, that the listener links to the actual sound emanating through the speakers see diagram below:

Time-domain visual representation of an audio-object

Such time-domain visualizations are based in modes of thinking and working that may be thought of as one of two ways of considering the audio-object. The first is to think of hearing as a passive organic machine absorbing sound – essentially the ear-brain mechanism whose salient associated features might be summarized as follows:

- The acoustical properties of sound
- The physical attributes of the ear
- The means by which the ear relays acoustical energy to the brain to produce the sensation of hearing
- The brain science of the impact of hearing on brain function (and form)

- Psychological phenomena that can be observed and measured.

These features are empirical because they can be studied, proven, or refuted using the scientific method. The second way is to think of listening as an activity that we do *to* our experience of hearing. Listening in these terms may be summarized as including the following features:

- Listening is something we do *to* sound.
- Listening is learned culturally – think of triadic harmony, melodic shape and instrumental arranging.
- Listening occurs in different cultural contexts including the concert hall, at home, in the car, using mobile devices / on the move, and so on.
- Different practices of listening have been developed especially from within the music fraternity – playing instruments requires specific ways of listening that will be different to those of the piano tuner, recording engineer, mix down engineer or mastering engineer.
- Philosophies and theories of listening have been developed that are then used as models for listening in practice.

These cultural and philosophical theories and practices of listening, and music making, are imbued therefore with social vestiges that, in the West, have a rich tradition dating back to the writings of Plato (c. 500 BC). Unfortunately, the first method (empiricism) does not really assist us in understanding the complexity of art forms, nor suggest why we should care. The successful scientific method tends to focus acutely on either the natural phenomena of sound itself or the effects of sound on the sensuous faculty of hearing. Also, knowledge of hearing

alone lacks an adequate account of how the sound is actually experienced by us, as conscious beings, in the form of music.

It is significant that in the "how to" literature for recording and music production, much thinking on sound remains of a rule-of-thumb kind, intertwining the empirical with the cultural. Take the term "muddiness", for example, which is used most often at the mix stage of the music production process. The term isn't scientific, because what it means for a mix to sound muddy is subject to difference of opinion, but the solutions may include precise remedies in the form of frequency and amplitude measurements and adjustments.

Bartlett and Bartlett, for example, list four possible causes of "muddiness" and offer several solutions:

> Muddiness (Lacks Clarity)
>
> If your sound is muddy because it lacks clarity, try these steps:
>
> - Consider using fewer instruments in the musical arrangement.
> - Equalize instruments differently so that their spectra don't overlap.
> - Try less reverberation.
> - Using equalizers, boost the presence range of instruments that lack clarity. Or cut 1 to 2 dB around 300 Hz.
> - In a reverb unit, add about 30 to 100 msec predelay.
>
> (Bartlett, 2002: 409–410)

Interestingly, such rule-of-thumb recommendations intertwine cultural and empirical measures, as if they both occupy the same space. And returning to our electronic producers, sometimes their language suggests awareness of the properties of sound in the empirical sense. As Manni Dee comments,

> You do anything really, I think er what I look for in sounds is just a kind of frequency a resonance of a frequency, erm and it's completely malleable from there, I can do what ever I want with it, like a piece of dough just stretching it out and flipping it around, you do anything, it's great. So, yeah, I can impose the qualities I want on the sound even if they don't exist inherently in the sound.
>
> (Dheensa, 2017)

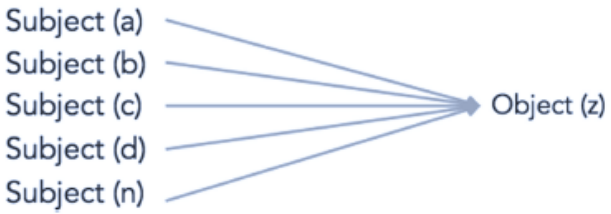
In this instance, for Dee it is clear that the primary objective is to acquire audio material of a certain sonic character that is ultimately pliant – perhaps even neutral. There is an affinity with Schaeffer here, who made concrete music by recording many different sounds, spending months carefully listening to each, experimenting with different ways to transform their sonic characteristics, and then combining this recorded material to form musical compositions. If you are unfamiliar with Schaeffer's compositions, list to "etude aux chemins der fer" (Railway Study).

Schaeffer realized that sound recording stimulated in the listener a visual imagery (of trains in the case of the "Railway Study"). Such visualization, he worried, would distract the listener from the musical properties of sound. So to solve this perceived problem, he turned to thinking about the subject-object relationship. He hoped to achieve a way of making concrete music with no visual references whatsoever. A complete discussion of this topic is beyond the scope of this chapter, but the following summary attempts to highlight its main features with reference to Schaeffer:

- Subject (a) apprehends Object (z)
- Objects (n) are apprehended using sense perception (ears, eyes, touch, smell, and so on), and through careful study of its data, we gain knowledge of said object/s
- Knowledge becomes empirical through repeat test conditions that allow us to check the outcome is always the same, or consistently the same

- If we attempt to derive knowledge from thought alone, there's the potential that the subsequent understanding is erroneous. Empiricism helps us to confirm the validity of our thinking by giving our ideas over to experience.

Schaeffer attempted to create a theory of composing with sound that had an empirical element by conceiving of a "transcendental" mode of listening whereby the sound object is purified by the removal of its visual reference (Schaeffer, 2002: 268), the idea being that listeners are thus unencumbered by any visual reference that may have resulted had the sound not been purified, leaving them free to concentrate on the innate music character of the "objet sonore" (ibid). Such a listening situation has an analogy to the way in which the disciples of Pythagoras received their master's sage words from behind a curtain or screen, so as to leave his teaching unsullied by visual references that may have been transmitted through physical gestures that were caught by the eye. The disciples of Pythagoras were reputedly known as "Acousmatikoi" – hence the term acousmatic music (Constantinou, 2009). Acousmatic music works, therefore, because multiple subjects (n) listen to an object (z) using a transcendental listening (see diagram below).



Pierre Schaeffer's transcendental listening

This listening situation is empirical, Schaeffer argues, because it utilizes an intersubjectivity of multiple subjects (n) that exist as a community who collectively agree on the purity of sound object/s (z) within the acousmatic situation. Schaeffer likens working creatively with sound to sculpture (Schaeffer, 2012: 14) and argues that finding sound objects is like

walking along a beach looking for seashells: “the seashell enthusiast takes up the object and this object says something to him” (Schaeffer, 2012: 148).

An Intuitive Approach to Working with Audio

Pop producers unhindered by the theoretical purity advocated by Schaeffer and his acousmatic followers have instead developed intuitive aesthetic approaches to the utilization of the audio-object. The Beatles song “Honey Pie” (1968) from the album *The Beatles* (1968), includes a section of spoken text by Paul McCartney saying, “Now she’s hit the big-time”. This spoken element is set in sonic relief to the rest of the production and is given a “music hall” sound through processing that references older recordings. To achieve the required sound quality the spoken passage was “heavily limited, chopping off the signals at both ends of the frequency range, and superimposing the sound of a scratchy old phonograph, to make the end product like a vocal from a very early and worn 78 rpm record” (Lewisohm, 1990: 159). Such a treatment offers the listener a sense of historical distance within the aesthetic framework of the song (Clarke, 2007: 56).

Another example from the commercial music domain can be heard in Björk’s song “Scatterheart” (2000) from her album *Dancer in the Dark* (of the same year). Two vinyl scratch sounds can be heard at the beginning of the track, and gradually these morph into the groove of the main beat (Clarke, 2007: 56). Such uses of the audio-object for the reasons described might be regarded as essentially un-acousmatic because they rely on the listener having a reference point.

The highly competitive nature of the DAW market has resulted in a race toward an increasingly user-friendly software experience, aimed at the general user. Software such as Logic Pro, for example, has the potential to be used by many types of musician, not just the commercially minded and successful electronic music producer (Paterson, 2016: 82). Nonetheless, a handicraft, or process, aspect of making something remains, as composer and

sound designer Alan Stones explains, “There’s a kind of goal you’re, generally aiming for, but it’s about process as well. It’s about what emerges as you make it . . . the process is definitely very important” (Stones, 2017). But whilst taking this into account, an important part of electronic music production is, for some, to have ready access to a plethora of readymade recordings that can be shaped into the desired sound. Such a readymade resource need not be fixed, however: it can completely change, as Jesse Tijn, who twice lost his hard drive, explains,

> it was good anyway because when I got new samples it changed how my sound was and stuff like that, I was happy about it in a way . . . it’s just like one of those weird things that I’ve accepted in my mind yeah, it’s almost like I’m renting them, or borrowing the samples and then, when the time’s right my hard drive will die again [laughs].
>
> (Kuye, J., 2017)

Whilst contemporary DAWs and practices of electronic music production may vary between the purity of the acousmatic and the grittiness of techno, what generally unites this plethora is the use of the audio as a visualized onscreen object. Many DAWs are multipurpose tools designed for use in a wide variety of music-making practices that reference and direct a creative modus operandi rooted in an earlier era of analogue equipment. The analogue era was one that utilized hardware tools as well as developed production methods based on the conditions that such equipment levied on the overall practice and musical outcome. Up-to-date DAW design does not need to be limited to those conditions imposed on the production of music by earlier forms of hardware equipment. So rather than limit our creative potential to a skeuomorphic metaphor, why not instead conceive of an audio-object production software whose features are determined by the essence of the audio-object itself.

Toward a New DAW-Based Paradigm Centered on the Audio-Object

An audio-object centered DAW, or DAOW (Digital Audio-Object Workstation), would emphasize the audio-object, moving away from skeuomorphic models toward paradigms that feature the creative and exploratory manipulation of sound, as a material for artistic pursuit in and of itself. The following is therefore a speculative model for the possible realization of such a DAOW:

1. Ergonomics: the preferred technology would be the portable touchscreen device.
2. Neutrality: audio-objects will be visually represented (VAO, meaning visualized audio-objects) on a blank background unencumbered by paradigms of linearity, verticality, channel-strips, grid-time, and so on. Clicking and holding on the screen would cause a directory window to appear, allowing access to the sound library/ies. A user will be able to build up a composite sound made up of the variously playing audio-objects and the sum of the resulting sonic manipulations.
3. Workflow: the extent to which layers of sound can be shaped will be by both an intuitive tactile (using the touchscreen device) instantaneously auditioned, and responsive to the agency of the imaginative response of the artist. The manner of visualization of the audio-object, its "content", will remain the waveform but boxed within a thin line for visual clarity. There will be an emphasis on quick and easy layering of multiple DSPs. Each DSP added to VAOs will incrementally change its appearance, operating as a visual guide to the object's transformation. Each DSP layer can be muted and/or automated. A (pre- or post-fader) bus-like DSP layer can be added, which will mean that a new auxiliary sprouting object will appear. Onto this object, more DSP layers may be added, thus providing users with the functionality of auxiliary sends but without the need for a visual skeuomorphism referring to the engineering practices of mixing consoles. Instead, multiple objects can be opened and organized onscreen. DSPs may be applied to a single or to multiple VAOs.

4. Time: because there is no obvious visual reference to the time line, DAOW will run at their existing speeds. But the speed of each audio-object can be time-stretched; the resultant object may be manually or automatically synchronized to a tempo in beats per minute (BPM) or stretched at multiple points and completely mangled. To time-stretch the VAO, simply click, hold, and drag to the desired duration. When tempos are used, a number box will show the exact BPM, allowing for synchronization of audio-object to beat, as necessary. And multiple VAOs can be synchronized either to a single BPM or to multiple tempi to form cross- or polyrhythms. One VAO can be synchronized to the same BPM as another simply by linking the two and designating each as either a lead or a follow. This will also work whereby, say VAO (A) is made to play in the same time as VAO (B). Or ten VAOs (B-K) all follow the tempo of audio-object (A). These follow and lead settings can be automated, so that they change at any moment, opening up the enticing prospect of a dynamic in-time shift in sonic texture from one moment to the next.

5. Spatial relationships: should two VAOs touch, the sound will change at the point where they overlap. This idea comes from the visual arts, where by two or more colors are mixed to yield a new hue. In our new DAOW, however, the angle by which the VAOs overlap will have an effect on the resultant sound. By turning the audio in such a way as the rear of the object goes over the front means that front and rear swap place, so the VAO is now the opposite way round; in this case the sound will reverse. But what if you twist the VAO so that the rear goes under the front? This is a different action and will therefore transform the sound in a different way. And what if the VAO is twisted so that rather than being reversed, the rear now forms the top of the object? In this case, perhaps every other sample could be reversed, producing a semi-reversed sound. And if we accept this, then it becomes possible to image any gradation of sound in between, given enough processing power.

Conclusion

This chapter has considered the ways in which particular DAW-situated paradigms can have a significant impact upon the way in which music is conceptualized and produced. I have noted, for example, that in designing and making DAWs, software companies leverage a combination of empirical knowledge and cultural vestiges, as seen in their foregrounding of skeuomorphic features of visual design and the inclusion of DSP algorithms which model past concepts of audio processing. Within this, I have focused on the conception of the audio-object in the context of electronic music production, which is often represented, during the production process, as a predominantly onscreen graphic, an item to be placed in the arrange window and synchronized to the beat.

I have suggested that working with sound recordings to produce music involves using both empirical acoustics, as well as an understanding of cultural norms, which are in practice not necessarily easily distinguishable. To support this, I have drawn attention to the work of Pierre Schaeffer, who used both theory and practice, by using sound objects to make first a concrete music and then an acousmatic music. The latter relies on the consent of a community faithful to the intersubjective cause of a pure acousmatic sound, seemingly clinically isolated from any visual reference it may potentially inculcate in the listener. I have suggested that contemporary electronic music producers put much stock in the audio-object as a material. And whilst they need not necessarily draw creative energy directly from Schaefferian ideals, such artists have developed the means of conceptualizing audio as material, whether in terms of its sonic aesthetics and/ or in combination with the agency of a DAWs' particular sonic modus operandi.

By firstly focussing on the audio-object and then secondly forming working objectives, I have suggested that it may be prudent to devise new creative modes of its engagement. The hypothetical DAOW, discussed earlier, is designed so as to illustrate what might result from a model based on emphasizing the audio-object as the central area from which creative energy

and processes emanate. It, of course, remains to be seen how, or whether, such DAOW ideas will develop in actuality. Perhaps, rather than veering in the direction of innovation and novel approaches, DAWs will continue to homogenize around a skeuomorphic nostalgia. Or it may transpire that the audio-object itself will cease to be thought of as a material used in the production of electronic music.

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