

‘SOUND DESIGN: AN INTRODUCTION’

Rob Bridgett for Computer Arts Magazine 2002

Abstract

Musicians currently working within the digital marketplace and within general music production will often find that a project requires more than just music composition, often an entire other layer of sound much neglected by composers: Sound Design. In addition to this, current musical trends are moving towards an assimilation of sound effects and sound design techniques into particular musical styles. Ambient music and new electronic music interweave recorded sounds into the structures of electronic composition and sound manipulation software. The following feature will introduce some of the basic concepts of contemporary sound design, followed by focus on how computer music making is assimilating these techniques and some basic ideas to help you keep this approach in mind for your own compositions.

Sound Design for the Moving Image

Two main areas exist in sound design for film and TV, the sounds of things we see on screen, and the extra information represented through sounds which appear off-screen, these are referred to as diegetic and non-diegetic respectively.

Fundamental elements of sound design for picture

Diegetic (on-screen) Sounds

There are several elements which make up the onscreen sound design and these usually take the form of 'realism' effects, what you see you hear! Rendering onscreen objects and environments real with a particular sound effect, be it the sound of someone moving via footsteps or room-tone atmosphere of a particular space.

Foley

Foley is the art of re-creating sounds which generally occur onscreen by people moving, such as the right kind of footstep on the right kind of surface, synchronised to when it occurs on screen. These are typically as realistic as possible and create the illusion that the sounds were recorded on location and are generated by what we are seeing. Foley is in fact an art unto itself. Most post production facilities have a Foley stage and there is a good living to be made by being a Foley artist who re-enacts all the footsteps and movements the characters make onscreen. In films such as the Star Wars trilogy or heavily laden special effects movies this can take a rather abstract form, creating sounds for animals and creatures that do not exist in real life.

Spot Effects

These are a subdivision of Foley, and are effects such as impact sounds or button pushes, which can be visually seen to occur and thus require a sound effect in order to render them realistic. A great deal of environmental information can be imparted subconsciously through these effects, such as the heavy metal sounding prison cell doors in the UK TV show *The Bill*. These doors are actually made from MDF on set and would produce a rather weak wooden sound as they are slammed shut...not the effect required!

Sound Effects

Any special effects which are added to heighten the emotional and physical impact or meaning of a particular object, location or action. A recurring example is that of whooshing credits or 'fly-by sounds' in Hollywood cinema. These sounds are 'expressionist sounds', in the same way that German Expressionist cinema exaggerated the angles of objects to create a distorted and subjective version of reality, this occurs here with sound. It is more often than not these sounds which need to be created using sound design software. The tutorial later will walk you through the creation of a whoosh sound effect. This can either be used in sync with an object on screen such as a fly by, or it can be used within a musical composition to hide a transition.

Non-Diegetic (off-screen) Sounds

Atmosphere / Ambience

The right crowd atmosphere or general room-tone is an essential canvas upon which to place all subsequent sounds. Indeed, this is usually the best place to start when designing sound to picture, the canvas upon which you will build all other sounds, and getting this right is often the very first thing which makes the scene seem 'real'.

Extra meaning can be brought into a soundscape through the use of sound effects or atmos which occur outside the square of the screen; you can suggest the presence of a large crowd of people, or a particular effect, such as a thunderstorm. These external sounds can produce additional narrative information or emotional impact. Generally these take the form of more abstract sounds, and as they are off screen cannot be readily identified, but may be revealed later on in the story. This trick can also occur with voice-over such as the wizard's voice in the *Wizard of Oz*: this is a huge booming God-like voice, but is later revealed as belonging to a very pathetic looking old man.

Silence

Strangely, one of the most effective tools available to a sound designer is the use of silence. A viewer or user can be drawn into the plot by effectively using certain areas of silence. The genre of Horror films is notorious for its structuring of silence and sound.

Sound Design techniques and their application to Music Production.

Sound Design has long been established within the film, television and more recently the multimedia industries. The techniques and methods that are used within this field are now being imported into music production in general, in particular with electronic composers now finding themselves using software to arrange their work, which is the same as most professional sound designers and editors use. It is also the techniques and disciplines that are moving over from sound design into music production, the ways of conceiving a piece, and the ways in which the ear is deceived into thinking that something is real. One of the main elements of Sound design for Film is to make the viewer believe that the sounds they are hearing are being emitted from the scene which they are watching...the truth is however that practically every element of a film or TV programme's soundtrack is reconstructed afterwards; dialogue, footsteps, all the squeaky, rustling movements that actors make when they move are all re-recorded and dubbed afterwards. Even the dialogue, where it isn't useable because of on set noise or directions being shouted by the director is replaced where necessary, this technique is known as Automated Dialogue Replacement (ADR). The point is that the viewer is never aware that any of these elements have been re-recorded in post production. Many of these actual techniques can be applied to music, particularly when you require the music to sound like it has actually been recorded and performed by actual musicians.

Other techniques that are relevant from film sound design are the layering of atmos effects and spot effects. In film, a scene is often underscored by a particular atmosphere sound effect, for example a tranquil garden in midsummer which has birdsong and a gentle breeze blowing through the foliage. Occasional spot effects of a passing car in the distance may also suggest that the garden is in fact in a suburban setting rather than being completely isolated from civilisation, and this can convey certain narrative information. Particularly in ambient music this type of 'audio scene' works very effectively.

Setting the audio scene

In Ambient music, sound conveys its own inner meaning. Theoretically this can be traced back to electronic music of Stockhausen and the theories of 'reduced listening' espoused by the French 'musique concrète' school of thought, particularly by Pierre Schaeffer and Michel Chion. Here, sound is either generated by purely electronic means, or is taken away from the physical source that created it and re-assigned as pure sound. Ambient sound also carries vague abstract associations with music which relate to human emotions and also with sounds in nature. Low frequency, sinister sounding ambience can convey unease, or the mood of the sounds can be lighter and more relaxing.

Ambient sounds are relatively easy to produce and generally have the same set of rules applying to their execution. We will illustrate how to create an ambient soundscape in the tutorial for Sonic Foundry's Vegas.

Spot effects and disguising 'production'

Sounds such as Foley are put into film and TV productions because if they were absent there would seem to be something 'wrong'. One of the most frequent problems with creating digital music is that it can sound too over produced, or too clinical. This is not only down to the lack of 'humanising' in sequencers with their all too accurate tempo, but down to the way in which samplers pitch-shift the notes of many instruments, soft samplers still have this problem with some instruments. Also lacking are the 'mistakes' or sounds that are generated from the physical instrument when it is being played. A piano will generate creaking sounds from the pedals being operated, and a guitar when being played has the unmistakable sound of the fingers scraping along the strings. These are sounds which we associate with the 'real' instrument and therefore the re-creation and the insertion of these sounds subtly and artistically within a piece can fool the ear into thinking that these are in fact real instruments.

Another important part of fooling the ear into believing that your instruments have actually been recorded in a performance is to add on room reverb. This is often very subtle reverb that is constantly used in film and TV to make the Foley, dialogue and spot effects seem as though they have been recorded in a room with the exact dimensions and acoustic properties as the one we see on screen. A lot of sound design work will be matching the room reverb settings for the post production sound to that of the sound and dialogue recorded on set. This technique can be applied to music. Added to a piano, guitar or orchestral style score this can create the illusion that the piece has been recorded and performed in a live space rather than inside a computer.

The essential element of sound design is the creativity of the individual. Being as the software involved is more than likely already familiar to you, the limits to what you can achieve are down to the type of sounds that can you can create and manipulate. The manipulation and creation of these unique and unheard of sounds need not necessarily be overly complicated or esoteric. Very simple processes, such as the addition of a series of delays, reverbs and other effects very often produce sounds that bear only very basic timbral similarities to the original sound. A good ear will be a better guide than an involved technical knowledge of the processes and inner workings of the audio processes involved. The latest addition to Sound Forge 5.0 in the form of the acoustic mirror allows the sound designer to play with sound to an infinite extent, virtually every time you use this effect you will be generating something which has never been heard before. CoolEdit has a similar feature in its

'convolution' effects, although this is harder to gain good results from, unique and strange sound effects can be produced.

The field of sound design is now often spilling over aesthetically into music composition, and indeed with the convergence of music sequencers and sound generation software the boundaries between the two areas will become more and more blurred. Where this will lead is down to how much composers and sound designers are prepared to create these new sonic worlds and in doing so redefine what we know separately, for the time being at least, as 'music' and 'sound'.

Working Practices in Sound Design

Linear (Film or Digital Video)In this medium, usually Film or TV, the premise is to re-create the soundscape which should have been recorded on set; this, in the form of Foley, ADR, spot effects, atmos laying etc. will provide the basic canvas of realism. Built on top of this would be any extra-narrative effects required by the director, usually in the form of non-diegetic ambient sound. The sound design has to work as a whole along with the music score which has been commissioned. Usually composers for film and TV never get to collaborate too closely with the post production sound designers and will often find themselves going for the same dramatic points within the narrative. Often this can cause a cacophonous clash, so a very skilled sound designer will know which parts of the sound design to remove, or mix into the surround channels at the final dubbing stage, in order for the whole soundtrack to work together coherently. **Non-Linear Interactive Media (Web / Computer Entertainment)**In web or interactive entertainment many of the same ideas are present as they are for the linear medium of film. The one crucial difference is the interactive element. This means composing and conceiving of a soundtrack which will be able to be performed by the application in as many different ways as the user can possibly interact with it. A particular ambient soundscape for a graveyard, for example, will need to be able to sit comfortably with a composed piece of music which could occur when the player opens a vault or, equally, battle sound effects which can happen at any point in conflict with a supernatural being. The interactive soundtrack should therefore be designed with implementation in mind, such as fade ins and out, how the sounds dovetail with one another and cross fade in particular circumstances. This can be communicated by the sound designer to the Coders. The same notions exist within contemporary web design. Sound object action script in design software such as flash 5 now enables sounds to be faded in and out and positioned in stereo in accordance with user input such as mouse position. The interactive sound designer and composer needs to conceive of the whole project as a series of macro-events which can co-exist with one another at any given time.

Suggested Software

Though much sound design, as with music production, occurs through dedicated external devices such as desks and dubbing stations, due to an increase in professional quality of software and speed of computers, professional audio recording, editing, mixing and sound design is moving towards low cost solutions on a computer based system. **Audio Editors****Sound Forge 5.0** Sound Forge 5.0 is pretty much the industry standard audio editor employed by most interactive or freelance sound designers. Its simple to navigate editing processes and batch processing (now disappointingly offered as a separate program Batch Processor 5.0) capabilities make this the ideal program with which to begin the process of sound design. As well as superb digitisation and editing features, it also supports a great deal of plug-ins, which are ideal tools for creating sound effects. Perhaps the best 5.0 addition from an ambient sound design point of view is the Acoustic Mirror. This convolutes the source sample with any other wav sounds you may wish to choose. **CoolEdit (PC)**Another top choice for professional sound designers is Cooledit. This offers multi channel mixing advantages over Sound Forge and supports the same plug-ins packages, so perhaps has a slight advantage in this respect. Another clear advantage is the ability to view a wave form in its 'spectral view' and this is by far the easiest and cleanest way to remove unwanted clicks and pops from a sound file. **Sound Effects Creation****Metasynth (Mac only)**This remarkable piece of software, unfortunately available on Mac only, is a sound designer's dream. The program takes visual information in the form of PICT files and transfers them into sound. It reads the picture from left to right, separating reds and greens into the stereo spectrum, the vertical axis representing frequency, basically translating any picture into sound. The sounds one can produce with this software are unlimited and very esoteric. **Multi-track Mixers****Pro Tools (Mac and PC)****Video Vegas (PC)****Acid Pro 3.0 (PC)****Logic Audio**Pretty much all software mixers perform the same basic functions. The essential elements for sound design are that sounds can be mixed together, layered on top of one another. An onscreen explosion for example may consist of tens of different sound elements, from low frequency rumble tracks to details of the explosion material, such as glass breaking, concrete breaking etc. Another important feature which is available on all the sequencers mentioned above is that they support 'to picture' work, in the form of an imported movie file. This simply allows you to design the soundtrack along with the image track, be it AVI, QuickTime or Mpeg. **Post Production Software****T-racks (PC)**Finalising the mix is a very important feature of the whole dubbing and mixing process. Usually the sound track will need some form of compression to bring up the volume of the more subtle sound effects and atmospheres. T-racks is one of the best programs for this task, not only does it support 24 bit processing but it also offers a great variety of mastering tools, from stereo enhancement to EQ tweaking.

Sourcing sounds: Making your own recordings

A great deal of sound effects need not be taken from sound effects CDs, but in fact they can be easily and creatively recorded and manipulated. In terms of quality a minidisk recorder is often far better for location recording spot effects and collecting atmosphere sounds because of its portability and low noise operation. It is a portable recording studio and editor which can be kept on you at all times. Digitising directly into the audio editor will give you further noise reduction possibilities and infinite control over the sound from there.

Recommended listening

Some of the best examples of the recording techniques mentioned can be found on the following recordings...

Aphex Twin's *Drukqs*. In-between the heavily edited tour de force bit crushing, there lie some remarkably subtle and beautiful pieces. Tracks such as ---- and ----- make use of very well disguised computer editing practices. Not only this but clever use of room reverb has been applied to make it sound as though it has been performed in a physical space. Overall this record illustrates these techniques very clearly and shows the way forward for composers working in digital music that the techniques used for editing drums can be applied to any sound.

Ambient:

Again Aphex's earlier release 'selected ambient works,' is here a perfect example, and practically set the scene for most ambient artists to follow. Slowly evolving and repeating melodies and ambient sounds drift slowly in and out of this often dark album.

Recommended viewing.

David Lynch's *Lost Highway*, *Eraserhead*. The use of room tone and simple background atmos is exceptional in the films of David Lynch. Lynch's *Eraserhead* was of great influence on the early genre of Industrial recording artists such as *Throbbing Gristle*. The first half hour of *Lost Highway* illustrates a great sense of unease within the sparse and ambient interior scenes. *Eraserhead*, now considered an underground cult classic, also features a great deal of superbly designed background atmosphere. The industrial soundscapes created by Lynch and sound designer Alan Splet should provide a great starting point and inspiration to producing such soundscapes.