

Writing Music for Animation, Video Games & Virtual Reality

I. The Composer's Brief

The composer will meet with the director of the production at a **spotting session**, to decide what kind of original music will go where in the production. Discussion can be focused more on emotions and effects, rather than musical aspects *per se*, with which the director may not be familiar.

Through the contract (see section VI below), the composer will be commissioned to compose, arrange, perform (and/or have performed), record and mix the music, before delivering finished, mixed masters. The composer will not normally be obliged to re-score the music after delivery of finished mixed masters.

The composer may have to begin work with concepts (e.g. for animation a storyboard or still-frame **animatics**¹). In computer games there may be character sketches. The visual material may exist in a rough cut or a (final) locked edit (this is rare). Having a locked edit is ideal, because music can be timed directly to it.

Music is timed to picture through a digital audio workstation (DAW). The principle of synchronization stems from the formula:

$$\text{duration of 1 beat} = \frac{60 \text{ seconds}}{\text{metronome mark}}$$

In calculating click tracks (see later) the composer should take care to distinguish between simple and compound time signatures. A dotted crotchet (dotted quarter note) is the beat in a 6/8 time signature for example.

Each cue will have a SMPTE² start time. SMPTE shows time in hours:minute:seconds:frames. A frame is one still picture from the animation. Production companies may work at different frame rates, e.g. 24, 25, 32 drop-frame etc. The composer will need to know what frame rate is being used and will set their DAW to run at the same frame rate.

Music will be supplied in a format useable by the production company, e.g. aiff or WAV files in a **Music XML**³ file. The Music XML file holds information about the name, duration, order and starting time of each piece of music (or '**cue**') in the production.

The composer will also provide the production company with a **cue list**. This lists the titles of the music pieces, their start time in SMPTE format and their duration. The cue list is vital for the production company to be able to check publishing (the work) and master (the recording) licences with performing rights organizations.

¹ An animatic is the first form an animation takes on screen. Still pictures of successive scenes are shown, usually as black and white sketches, which jump crudely from movement to movement, to establish looks and timings.

² SMPTE: Society of Motion Picture & Television Engineers, pronounced 'simp-tee'.

³ XML stands for 'Extensible Markup Language'. Music XML files can hold music notation, audio and timing information all in one, for porting from one piece of audio-handling software to another.

II. The Composer's Responsibilities

The composer will stick to an agreed schedule. (S)he is responsible for providing original material. The music must suit the production in the way the director and/or producer(s) wishes, and be closely synchronized to linear picture or active game play.

As the composer progresses, payments to her/him are normally made. If not all paid up front, these are usually divided into two, three or four part-payments at key stages of music production, e.g. on starting work, at the 'polaroid party' (see below), at the recording session, at the mixing session and/or on delivery of finished, mixed master recordings.

III. Adapting to the New Medium

Some composers need pictures to inspire them. If a composer is 'on a roll' with a composition for a scene, and that scene ends, the music may need to end perhaps prematurely for the composer. - Music has its own life, logic and syntax. In these situations, the composer can continue composing and save the extra material elsewhere for later use, as may be desired.

Virtual Reality divides into three areas: **virtual reality** (proper) replaces the user's world; **mixed reality** merges real and virtual worlds⁴; **alternate reality** inserts virtual objects into the real world⁵. Thus mixed and alternate realities are related.

In computer games, music has to be **interactive**. This involves providing music in the form of **stems**. A stem is a layer of music designed to be played on its own, or in sync. With other stems related to it. Different scenes in a computer game can be accompanied by successions of related stems. This brings to mind musical games constructed by such composers as J. S. Bach and Mozart, and the 'mobile form' approaches to music composition explored in Western art music during the 1960s and 1970s.

As electronic and electroacoustic⁶ music is so often used to enhance computer games and virtual realities, new aesthetics are developing which blur effectively the boundaries between diegetic and non-diegetic sound. Diegetic sound is that which can be heard by the featured characters. Non-diegetic sound can *only* be heard by the audience. Thus the sound of a laser gun in Star Wars is diegetic, the sound of the LSO is not.

Music in computer games is programmed to respond to players' actions. Thus games determine the form of the media music. Inadvertently, the player is a participant in the shaping of the form of the resulting music. Thus stem implementation forms a significant part of the creative process.

Computer game makers are often looking for new sound worlds. This puts the imaginative, trained composer at an advantage.

Adapting from linear (beginning-middle-end) composition, to composing 'Lego™ brick' stems for others to arrange music through play makes time structures in music much more convoluted, and potentially interesting to work with.

⁴ E.g. real people and cartoon people.

⁵ E.g. read-outs of information about a certain real person or place.

⁶ 'Electroacoustic' music is that which combines electronic and mechanical sound sources, e.g. music for synthesizer and flute.

IV. The Process of Composing to Animation, Video Games & Virtual Reality

Stems should be 'loopable' and sound natural when they do so. Where reverberation is part of a loop, then its tail may need to be mixed with the beginning of the sound, so as not to cause a 'swallowing' effect at the start of each loop iteration. The beginning of longer loops may sound more frequently for a game player than the loop's end. Thus looping stems need to be composed with a long shelf-life in mind. The talented, trained composer will know how to achieve this.

Computer games are organized in 'levels', e.g. passing from one room, land or state-of-play, to another. Game levels may require different styles of music with a range of intensities evoked per style. To date, intensity can be achieved crudely, by increasing the number of stems that play at any one time. To respect conceived instrumentation, the same musical instrument should not be made to sound in more than one simultaneous stem.

Rhythms, melodies, chords, instrument combinations and playing techniques can be assigned to different game characters. Players enjoy having musical themes associated with their characters. As one grasps the concepts for the musical use of stems, one realizes the importance of the musical disciplines of harmony, counterpoint, musical development and pastiche. As film composer Jerry Goldsmith has said:

*...it's a composition tailored for a particular film, and **all its elements must relate to one another**. ...This is where I think the seriously-trained composer is of more value, simply because **part of the study of composition is the concept of musical relativity and development.**⁷*

Composers will compose using a digital audio workstation (DAW), which is designed to handle musical timings in sophisticated ways. DAWs also generate and organize sound, while offering the composer elaborate tools for musical development, orchestration and for regular music notation, without the bother of time-consuming notation formatting, which is only dealt with where it belongs: at the final score-and parts production stage.

Generally, completed cues and/or stems are exported as mixed audio files from the DAW in the form of a Music XML file (see section I. above). Audio for computer games still needs to be integrated with the game. Integration will be conceptualized by the composer and game makers, but usually implemented by the game makers themselves, using **game engine** software. To date (February, 2020), examples of game engine software include *Blender*, *FMod*, *Unity* and *Unreal Engine*.⁸

While stems can be imported directly into game engines, **middleware** exists to smooth the transition of stems to game engine. Middleware accepts audio files and then enables the composer or game maker to determine under what game circumstances stems and stings will be triggered by aspects of game play. This is called an 'interactive music hierarchy'. The more segmented this hierarchy is, the more interactive the game's music becomes, to enhance responsiveness. Middleware simulates game stimuli to test game responses before they are fixed. It enables the composer to determine music and sound effect triggers; fades; volume levels (e.g. controlled by the condition of a character or if the character is behind an object); prioritizing; spatialization (including source point, movement, reverberation and relative positions of different players in the game). The area of spatialization in computer games is called **ambisonics**. Ambisonics involve the 'placing' of sounds in space in any position in a

⁷ Jerry Goldsmith on film music as 'fabric' in *The Omen* CD liner notes, Varèse Sarabande, 1990. Author's emphasis.

⁸ For further information on game engines please see the 'Software' section of the bibliography.

large, imaginary sphere around the game player(s). Thus sounds and music can seem to come from any direction, depending on how the player(s) play(s) the computer game.

Ambisonics extend the dimensions of audio from a 'flatter' antiphonal concert hall model, to a 3-dimensional environment in which all sounds can move freely. Examples of such middleware include Wwise and OpenAL.⁹

Building music and sound worlds for computer games involves of course close creative liaison between composers and computer game makers.

For processes of composition and production of music for linear animated film, the reader is referred to Fred Karlin's excellent book: On the Track (Routledge, 2004). A detailed description of this process is beyond the scope of this article, however, procedures can be summarized as:

- i. Being **secured** to undertake the work
- ii. Drafting and signing of **contract**
- iii. **Spotting session** with director and/or producer(s) to decide accurately what music will go where
- iv. **Composition** and harmonization of basic musical themes
- v. Building of conceived **instrumentation** on DAW
- vi. **Booking recording studio** (if needed) or hiring of other recording space
- vii. **Hiring of musicians** (if needed)
- viii. **Composing** of all cues
- ix. Pre-planning **stems** if for computer game
- x. **Polaroid Party** (see below)
- xi. **Recording** electronic backing track(s)
- xii. Making **masterscore and parts** manuscripts
- xiii. **Recording acoustic** parts (to conductor and/or click)
- xiv. **Compositing** (editing together) of best acoustic 'takes'
- xv. **Mixing** of edited acoustic recordings and electronic backing track(s)
- xvi. Checking **stem** loops and combinations (as may be necessary)
- xvii. **Exporting** music project as Music XML file
- xviii. Separate **mastering** of all music cues (if desired)
- xix. Embedding of **metadata** into all audio cues
- xx. Delivery of finished mixed **masters**
- xxi. **Notification of PRS and PPLUK** with cue lists (see Section I. above).

When starting to compose music, it's important to check that the creative direction the composer has embarked on, suits the director and producer's wishes. Thus it's necessary to organize what some composers call a 'Polaroid Party'. Here, a few short cues can be demo'ed, to check that director and producer(s) are happy, before continuing on the same compositional track. This guards against later disappointment and unnecessary music re-writes.

Before finished mixed masters are delivered, the composer should ensure that the necessary digital **metadata** has been 'watermarked' into her/his music. This will include ISRC and barcode numbers procured from PPL UK and GS1UK respectively.¹⁰

V. The Composer's Schedule

Experience is a great teacher and quickens the composer, who should know how many minutes of music they are capable of composing per day. The long time taken to set up an electronic

⁹ For further information on middleware, please see the 'Software' section of the bibliography.

¹⁰ See *Audio and Metadata Editors* in the Software section of the Bibliography.

/electroacoustic instrumental resource, to print & bind score and parts, to mix music, to edit and synchronize it - needs to be factored-in to a schedule essential to completing large projects on time.

The composer should divide the time they have to compose for a project, by the number of minutes of music to be written. Cue lengths will have been calculated in advance from the spotting session (see section 1 above). The composer will also know the potential style of each cue, e.g. slow love-scene music, fast action cue, stings etc. For obvious reasons, fast music tends to take longer to compose than slow. The average for professional composers is to be able to write approximately 2.5 minutes of quality, orchestrated music per day.

Cues to be composed can then be allocated to days in a diary. The composer can then pace their work to that plan.

Composition is a relatively sedentary and solitary occupation. For breaks, physical and mental health, it is essential that a composer incorporate regular exercise and a healthy balanced diet into their week. Joining a sports club is a good way of doing this, as one can then become obliged motivationally to one's fellow sports players.

VI. Contractual Issues

Beyond the usual composition commission, various rights will need to be assigned for the production company legally to be able to employ the commissioned music. See the Contracts section at the ISM website:

ism.org/advice-centre/contracts

There are various sources of contract, from generic, to expensive bespoke ones from one's own lawyer, to contracts provided by production companies and film/game studios themselves. These latter will almost always favour the production company and studio, and must always be checked over by your own lawyer for commentary and negotiated editing. Your own lawyer's fee should pay for itself over time.

Composer's payments will come in the form of a package deal on lower budget projects or a fee-based deal for higher budget projects.

The **package deal** involves a one-off payment to the composer who devolves music production costs as necessary to come up with finished, mixed master recordings at the end. The composer chooses how much they want to pay themselves.

The **fee-based deal** involves the production company or studio paying the composer a fixed fee, and taking responsibility for organizing and paying the music production costs themselves, separately. Fee-based deals normally involve higher sums, with the composer having to give up more of their rights to the music, in return. Studios will normally want to buy-out the composer in full. It is up to the composer's lawyer to negotiate agreeable terms *before* the music is composed.

VII. Ancillary Markets

On lower budget productions, ancillary markets can be lucrative for the composer. For more information, the reader is referred to Bobby Owsinski's useful book: Music 4.1 A Survival Guide for Making Music in the Internet Age (Hal Leonard Music Pro Guides, 2016).

VIII. Gaining Employment as a Composer of Music for Animation, Video Games & VR

Composing for moving image is a relationship business. The composer needs to be driven by their craft and not distracted. A business-g geared social media presence is essential. The ISM provide useful information on musician self-marketing via the ISM website. See:

ism.org/advice-centre/promoting-yourself

One should avoid working for free and composing 'on spec'. Instead, token work can be done and examples of related, past work shared. Sometimes example work might be produced, depending on the extent to which a composer is attracted to a project.

Many websites exist asking interested parties to pay for 'insider information'. Often that same information can be had for free by keeping an ear to the ground in the right places and by asking around as a normal part of networking.

It is important for the composer to know precisely how they see themselves: to find a niche and either to copy others and do it better (without breaching copyright), or to become highly distinct. Many composers have established a signature style that keeps them in pay. Know thyself. Be thyself.

Working successfully as a composer for moving image calls for a wide diversity of skill sets (music, technical, software, social, marketing and business skills), some of which can be gleaned from taking an appropriate, related music degree. Alternatively, young musicians can with consent 'shadow' more professional ones, to learn on the job.

There are opportunities for assisting other composers, for example in the related fields of music preparation, arranging, music editing, music supervision, concert master/mistress, orchestrating and conducting.

Bibliography

Books

Davis, Richard: Complete Guide to Film Scoring. Berklee Press, 2010.

Donnelly, K. J.: Music in Video Games: Studying Play. Routledge, 2014.

Goldmark, Daniel: Tunes for 'Toons. Music & the Hollywood Cartoon. University of California Press, 2007.

Kamp, Michiel *et al*: Ludomusicology: Approaches to Video Game Music. Equinox Publishing, 2016.

Karlin, Fred: On the Track: A Guide to Contemporary Film Scoring. Routledge, 2004.

Marks, Aaron: Complete Guide to Game Audio: for Composers, Musicians, Sound Designers, Game Developers. CRC Press, 2016.

Owsinki, Bobby: Music 4.1 A Survival Guide for Making Music in the Internet Age. Hal Leonard Music Pro Guides, 2016.

Phillips, Winifred: A Composer's Guide to Game Music. MIT Press, 2017.

Robinson, Ciarán: Game Audio with FMOD and Unity. Routledge, 2019.

Schifrin, Lalo: Music Composition for Film & Television. Omnibus Press, 2011.

Schütze, Stephan *et al*: New Realities in Audio A Practical Guide for VR, AR, MR and 360 Video. CRC Press, 2018.

Summers, Tim: Understanding Video Game Music. Cambridge University Press, 2018.

Stevens: Game Audio Implementation: A Practical Guide Using the Unreal Engine. Routledge, 2015.

Sweet, Michael: Writing Interactive Music for Video Games. Addison-Wesley, 2015.

Thomas, Chance: Composing Music for Games. Routledge, 2016.*

* Video examples here: youtube.com/playlist?list=PLGzF-dGWO-1F8pH6p_nLiKNqa15t9bZR9

General Advice

Allemano, Luigi: Making Music for Animation
vimeo.com/34973892

Animation Composer. ScreenSkills
screenskills.com/careers/job-profiles/animation

Berklee: Careers in Film Scoring
berklee.edu/film-scoring/careers

Gearslutz Fora: Music for Games /Pictures
gearslutz.com/board/music-for-games
gearslutz.com/board/music-for-picture

Guerilla Film Scoring
guerrillafilmscoring.com

How to Unlock the Creative Power of Audio in VR
asoundeffect.com/creative-audio-for-virtual-reality

Making a Living from Music for Picture (Parts 1-9)
soundonsound.com/techniques/making-living-music-picture-part-1

Middlesex University – Compose Music Moving Image With Film & Game Makers
mdx.ac.uk/courses/undergraduate/music

MIDI Film Scoring
midifilmscoring.com/film-scoring-jobs

Phillips, Winifred: A Composers' Guide to Game Music

youtube.com/playlist?list=PLz4U9TXsKWpGnKs0KsFQ63hrAJHoWZEKb

Phillips Winifred: Video Game Music Composer: Getting Your Big Break. Gamasutra.

gamasutra.com/blogs/WinifredPhillips/20190211/336357/Video_game_music_composer_Getting_your_big_break.php

Ricard, David: Cartoon Composing. Sound on Sound

soundonsound.com/techniques/cartoon-composing

Scorbit

scorbit.org

Sound on Sound: Technique Articles

soundonsound.com/techniques

Nguyen, Tuan: 3D Audio is Back and VR Needs It

pcgamer.com/3d-audio-is-back-and-vr-needs-it

Wall, Jack: Composing for Video Games. Sound on Sound

soundonsound.com/techniques/composing-video-games

Industry

Animation Alliance UK: Resources

animationallianceuk.org/resourceslinks

Association of Independent Music

aim.org.uk

British Film Institute: Animation

bfi.org.uk/search/search-bfi/Animation

Broadcast Now

broadcastnow.co.uk

Developmag

developmag.com

EuroGamer

eurogamer.net

Future Publishing & PR

futureplc.com

Games Radar

gamesradar.com

Game Sound Conference (US)

gamesoundcon.com

Guild of Music Supervisors (UK & European)
guildofmusicsupervisors.co.uk

PR Week
prweek.com/uk

Screen Daily
screendaily.com

ShootingPeople
shootingpeople.org

Skwigly: Online Animation Magazine
skwigly.co.uk

Society of Composers & Lyricists (US)
thescl.com

Software

Digital Audio Workstations (DAWs):

Ableton: Live
ableton.com/en/live

Apple: Logic Pro
apple.com/uk/logic-pro

Avid: Protools
avid.com/pro-tools

MOTU: Digital Performer
motu.com/products/software/dp

Steinberg: Nuendo
new.steinberg.net/nuendo

Steinberg: Cubase
new.steinberg.net/cubase

Music Notation Software:

Avid: Sibelius Notation
avid.com/sibelius

Makemusic: Finale
finalemusic.com

Steinberg: Dorico
new.steinberg.net/dorico

Audio Metadata Editors:

Amvidia Tag Editor (Mac)
amvidia.com/tag-editor

Mp3Tag (PC)
mp3tag.de/en

Mp3 Tag Express (PC)
mp3tagexpress.com

Spatial Audio Engines:

OpenAL
openal.org

Wwise
audiokinetic.com/products/wwise

Game Design Platforms:

Blender
blender.org

FMOD
fmod.com

Unity
unity.com

Unreal
unrealengine.com

List of Game Engines:
en.wikipedia.org/wiki/List_of_game_engines

February, 2020

Dr François Evans is Associate Professor in Music at Middlesex University, London.
Produced in association with Middlesex University, London.

