THE MUSICAL PARAMETERS OF IMMERSION AND FLOW: INVOLVING THE PLAYER, EMOTIONALLY AND PHYSICALLY, IN A VIDEO-GAME.

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Copyright Statement

Synopsis

Player involvement in a video game is increasingly important to the success of a game and its developers. A musical soundtrack plays a large role in this success, having the ability to enhance a player's sense of physical and emotional involvement with a game world. It is imperative, therefore, of a video game soundtrack to incorporate the ideas of flow and immersion, areas of interest which have been debated thoroughly by increasingly large numbers of academic works. This thesis takes the main argued parameters of flow and immersion and applies them to a model, identifying how a composition can increase, or subsequently decrease, a sense of involvement for a player, in narrative, action-adventure RPG genres of video games. Each parameter in the model explains its relation to flow and, or, immersion and how it can be combined with the other parameters to enhance player involvement.

A consistent representation of an audio, visual, and player relationship is important to the formation of flow and establishing a convincing game world for the player, without any misrepresentation of sound or jarring transitions. With a player's sense of physical involvement through flow, immersion can then be achieved, as the player becomes invested emotionally with the game world, culture, and its characters. The supporting composition and two case studies in the thesis help prove that, when following the different parameters of the model, player involvement can be enhanced through a soundtrack.

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Figures, Tables, and Examples

Chapter 1: Introduction

Throughout media, such as film, television, and video games, a strong audio-visual relationship is important to the synchronicity and continuity of on-screen action and audience involvement. A lack of attention to this and audience members can be pulled out of any involvement or immersion they once had with the moving image. Immersion, in any type of media, removes a person from conscious thought, bringing the screen to the forefront with a deep absorption into a mediated world. Synchronicity between a soundtrack and visuals is imperative to any involvement with a moving image, for without a soundtrack, images appear alien or even unreal, as Chion (1990/1994, p.63) would argue that synchresis (a mixture of synchronism and synthesis, Chion's own creation) is responsible for our conviction that the sounds heard are indeed the sounds related to the image on screen i.e. 'the sounds heard over the shots of the hands in the prologue of *Persona* [a 1966 Ingmar Bergman film] are indeed the sounds of the hammer pounding nails into them'.

When looking at video games, interactivity becomes a part of this audio-visual relationship, as there is now a player involved with the movement and development of the moving image, especially its narrative. A soundtrack now has to follow a player's movements whilst changing its musical material in reaction to on-screen developments; 'interactive audio-music that swings with each turn of events provides an adaptive soundtrack, giving the feel of participating in an interactive movie.' (Marks, 2009, p.234). Video games can be thought of as an interactive movie, from a film perspective, however contrary to Marks statement, a unique balance of challenge, mechanics, narrative, music, image, etc. which occurs alongside interactivity allows a video game to be played and progressed by a player rather than just witnessed.

Mihaly Csikszentmihalyi's concept of flow is an important aspect of the audio, visual, and haptic relationship a video game has with its mechanics and soundtrack. Without flow in a game, it's easier for a player to witness all the different aspects of a game without a sense of continuity, and will possibly result in a lack of involvement and immersion; music comes involved at this stage. To create flow, continuity must be provided between musical material, the player's interactions, and what is occurring on screen, to avoid losing connection with the game world. If this continuity is lost then flow and immersion are unable to exist as a player will not be able to situate themselves in the world.

This thesis aims to identify what parameters a successful soundtrack will need in order to create effective flow and immersion, in order to allow a player to become physically and emotionally involved with a game world. A variety of approaches, scholarly and non-scholarly, to flow and immersion must be researched and synthesised to best represent each term before identifying how music can have an effect on the player. The paper will also be using case studies in order to ground the research and explain how music has been used in previous video games to create immersive environments for players. A model will be used in order to combine various musical parameters in relation to immersion, illustrating their triggers and placement in a game world. The model will work between two tiers, with the first identifying how to form flow and the second being more involved with the physical and emotional involvement that makes up immersion for a player.

Much like all types of media, there are a variety of different genres of video games which affects the style, gameplay, and soundtrack. Certain genres will use music to enhance gameplay rather than to create a narrative, they can still create flow and immersion but this is through different means. For example, collectable card games i.e. *Hearthstone: Heroes of Warcraft* (Blizzard, 2014) and certain strategy games i.e. *Endless Legend* (Amplitude Studios, 2014) use music as a musical wallpaper, with sound design being more important to what is occurring in the game and for any feedback. Therefore, I will be applying my research to role playing games (RPGs), specifically single player adventure games, which in itself divides into many sub genres, however RPGs include a story/narrative and culture, where the player is in control of an avatar and the given narrative, with player control being the focus of this paper. 'All the components of an RPG are structured to encourage the player to get out into the world and interact with it, learning about the people and culture while simultaneously advancing a compelling storyline through successful combat…' (Phillips, 2014, p.103).

Chapter 2 will introduce the main areas of flow and immersion, their situation within existing literature and how they relate to media and video games. A model will then be constructed out of the understanding of these areas, with each parameter in the model being identified and explained in its relation to the creation of flow and immersion. This model will then be applied to two case studies to outline its effectiveness, before the final section that considers how the model can be useful in my own compositional practice.

Chapter 2: Literature on flow and immersion

Flow

In order to understand flow as a concept in video games, it is important to define flow, assess its origins, and apply it to a medium. Flow is a product of Mihaly Csikszentmihalyi who defines it as when '"people become so involved in what they are doing that the activity becomes spontaneous, almost automatic; they stop being aware of themselves as separate from the actions they are performing"' (Csikszentmihalyi, 1990, cited in Phillips, 2014, p.38). Csikszentmihalyi's definition of flow allows for automatic involvement to create a sense of uninterrupted gameplay movement.

As Nacke and Lindley discuss in their paper 'Affective Ludology, Flow and Immersion in a First-Person Shooter: Measurement of Player Experience', Csikszentmihalyi's research was 'based upon his studies of the intrinsically motivated behaviour of artists, chess players, musicians and sports players' (Nacke and Lindley, 2010, p.4). Alongside this quotation, Nacke and Lindley's paper showcase Ellis's edited version of Csikszentmihalyi's original flow chart; shown in figure 1.

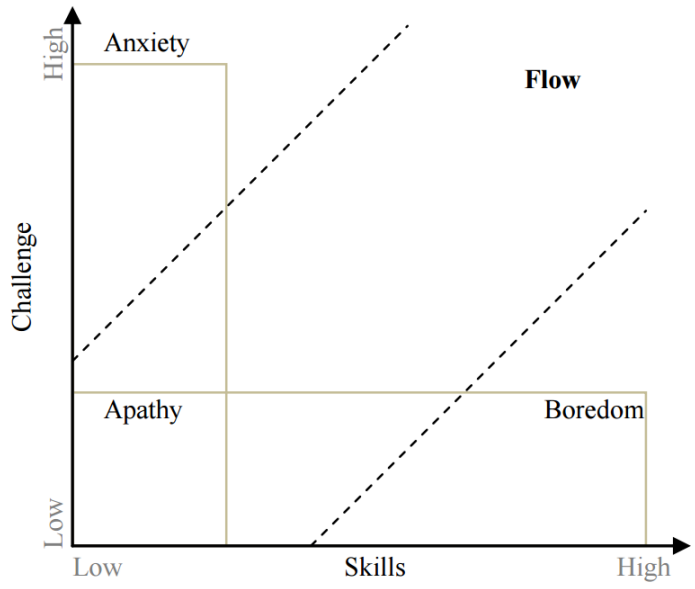

FIGURE 1: *ELLIS' REVISION OF CSIKZENTMIHALYI'S FLOW CHART (NACKE AND LINDLEY, 2010, P.4)*

When applied to non-mediated games, such as chess, this chart predicts the fundamentals of flow that video games need in order to form the basic involvement levels that would allow a player to feel flow within the game, or at least a sense of continuity without finding too much, or too little, challenge in the game world. This sense of flow, as a compositional synchronisation in a mediated environment such as a video game, draws on Weibel and Wissmath's article on immersion in computer games which explains that 'flow refers to an experience of being involved in an action' (2011, p.3).

As shown, challenge and skill are needed in forming a sense of flow, and to quote again from Nacke and Lindley, they review Chen's paper, 'Flow in Games', who believes that there should be 'different "flow zones" and an optimal intersection for hardcore and novice players, within which the experience converges towards an optimal match of challenges and abilities' (Chen, 2006, cited in Nacke and Lindley, 2010, p.4). One would have to agree with this critical view of the flow chart as it does not take into account variations in human ability and skill. However, as Nacke and Lindley further discuss, Novak, Hoffman, and Yung (2000, cited in Nacke and Lindley, 2010, p.4) report multiple different studies of flow, with 16 found between 1977 and 1996, all of which use different languages and models to define the term; flow has a wide range of appearances and can be different for each individual, dependant on the activity. It is also useful to point out that video games have adapted between 1996 and the present, having ways of dealing with skill level, such as the ability to adjust difficulty levels and better overall technology to aid game mechanics, allowing games to be more user friendly.

When introducing mediated games, which rely upon interactivity, to Csikszentmihalyi's flow chart, it can be deduced that there are two separate types of flow when it is in relation to video games. Weibel and Wissmath (2011, p.2) explain Rheinberg, Engeser and Vollmeyer's understanding of a two dimensional flow:

> An adaptation of Csikszentmihalyi's concept of flow with regard to specific experiences of human-computer interactions was assessed by Rheinberg et al. In a factor analytical approach, they found that the construct contains the two dimensions: (1) smooth and automatic running and (2) absorption. The first factor refers to the feeling of utmost concentration and focusing. Control over the activity, clarity of the operations, and smooth and automatic cognitions. The second factor refers to the feeling of full involvement, distorted sense of time, optimal challenge, and absent mindedness.

Rheinberg takes Csikzentmihalyi's concept of flow and applies it to a mediated environment[1] such as television, film and video games, explaining flow as a continuity of audio-visuals without any disruption to synchronicity and an audience/player's cognitive sense of narrative. When applied to audio, synchronicity can be seen as an integral part of the original idea that flow can inform cognitive involvement, whereas, the player's sense of story can be applied to compositional aspects of a moving image in relation to immersion through physical and emotional involvement in a game world. This relationship is visualised in table 1.

	Cognitive Flow	*Moving Image Flow*
Immersion	Understanding/knowledgeable	Narrative Immersion
	Uninterrupted mental involvement	Emotional involvement
		Physical Involvement

TABLE 1: COGNITIVE AND MOVING IMAGE FLOW. TABLE BY THE AUTHOR.

Nacke and Lindley (2010, p.4) argue that 'Logically, one could see immersion as a precondition for flow, since immersion involves a loss of a sense of context, while flow describes a level of complete involvement'. Video games' must visually and musically follow a player through a virtual world whilst keeping flow through non-determined changes in image, following environmental developments; cut-scenes; different characters; emotional representations; actions; achievements; failures and so on; and these variables change depending on the genre. Therefore, flow can be seen as a precondition to immersion: without flow between these variables, immersion and player embodiment is difficult to achieve. Looking into player involvement, both physical (interacting with a console for example) or emotional (involvement with in game culture/characters), it would be best to break involvement down into two sub-sections; cognitive involvement, and emotional involvement (including physical). Contradicting Nacke and Lindley's description of flow as complete involvement, it could be argued that flow compliments a player's physical and cognitive involvement in a game, and immersion then refers to the emotional involvement of a player. Phillips also explains that

[1] An on-screen image which provides, at least, audio and moving visuals; the environment can be both real world and animated.

'Csikszentmihalyi's concept of flow depends on a loss of personal awareness and a sensation of spontaneous activity independent of conscious direction. If we apply this theory to the concept of game immersion, then in order for the activity of gameplay to become immersive, the actual procedures must reach the state of an automatic response, similar to a reflex action' (2014, p.42). If a player must reach an automatic response before immersive game-play takes place, then cognitive involvement must come before any emotional investment or a player will struggle to find immersion before flow.

Immersion

In a similar way to much of the literature on flow, immersion is discussed intently amongst Ludomusicologists, but its definition fluctuates between scholars, and therefore 'immersion' does not have an accepted meaning. Although some ongoing debates around immersion are perhaps starting to feel dated, there is still value in its concept as it inspires research around its implications in music for media, especially as player involvement has an influence on a game environment, its world and inhabitants, through their interactions with the game world (Calleja, 2011, p.55). When immersion is paired with flow, as it is here, a collaboration is formed which allows insight into a player's reception of game audio, and the emotional and physical connection to a game this may achieve.

This paper adopts a definition of immersion as an aspect which removes a player from conscious thought and time, reducing their own personal boundaries to those of the player-character in the virtual world, the screen becomes the gateway to deep absorption, and the virtual world becomes believable.

Immersion is disputed throughout academia yet is used throughout non-academic works and is frequent in gamer culture, online reviews and general terminology. For example, a popular YouTuber under the name of Zero Punctuation describes immersion as the following:

> Let me tell you about immersion, immersion is when you go for a midnight walk after a weekend marathon of Thief 2 and catch yourself looking for your visibility gem… Immersion can save the life of a bad game and, inversely, a lack of immersion can be a dog-shit bullet right between the eyes. (Escapist, 2011)[2]

[2] The video in which this quote is collected can be found at https://www.youtube.com/watch?v=qvz3ANcAvSc (Escapist, 2011), from 00:01:51 – 00:02:24.
N.B. YouTube links will be introduced in footnotes for fuller versions of videos, tracks, and game-play. These links will be referenced in the Videography.

Many gamers[3] have voiced their opinion on immersion in some of their favourite games and although not academic, their opinions are just as necessary as immersion is focused on the people playing the games. A few representative opinions can be seen in table 2.

Jun_aka_pekto (n.d.)	For me, immersion would be me feeling like I'm really interacting within the environment. For the games I play like say, Crysis, the foliage should provide both concealment and cover. I also turn the game music off because because that's the last thing I'd hear in a hot zone. In the real world, I like to tune in to the sounds of the environment where subtle changes like birds suddenly stopping their chirping can indicate something. That'll be kind of hard to replicate in a game. Just the same, I like to hear game environmental sounds rather than game music.
Cprmauldin (n.d.)	Role-playing games are the most immersive to me because when you are "role-playing," you become one with the character you are playing.
OatsMalone (n.d.)	Ultimately, I think that immersion is an expression of empathy with a character. Different techniques will appeal to different people. For some, immersion can be found in more total control over a character's actions (Planescape: Torment is a fine example there, as are many Bioware games), though those games are also often short on physical immersion. FPS games tend to be more conducive to physical immersion.
Hanes666 (n.d.)	A major factor, something games often fall down on, is a great soundtrack [When lacking in a great soundtrack, immersion is spoilt for a gamer, and can affect them even outside of the game world]

TABLE 2: PLAYER OPINIONS ON IMMERSION. TABLE BY THE AUTHOR.

Table 3 identifies a variety of academic definitions of immersion by video game composers, psychologists, and researchers.

[3] Gamer: A common nickname for people who frequently play video games.

Author	**Definition of Immersion**
Phillips	'The concept of sinking completely within something, or being absolutely surrounded by it, is the core principle of immersion.' (2014, p.37)
Weibel & Wissmath	'…immersion or involvement in an activity (i.e., the gaming action)' is an interesting term which has been argued over in relation to its actual definition. (2012)
Calleja	'…it is lucid dreaming on demand, a pay-per-act performance inside a virtual world so compelling it is challenging to distinguish it from reality itself' (2011, p.17)
Collins	'... Our perception is always coupled with a mental re-enactment of our physical, embodied experience' (2011, p.40)

TABLE 3: ACADEMIC DEFINITIONS OF IMMERSION. TABLE BY THE AUTHOR.

Table 2 shows that players see immersion more to do with being involved in the environment, characters, and overall game worlds. These opinions are not too dissimilar to table 3, where academics identify immersion mostly with becoming involved or having an embodied experience in a game world. Although disputed, a lot of ideas of what immersion is, and how it works, are very similar inside and out of academic writings; the conclusive definition is just undecided.

In 2006, when the debate between 'ludology' and 'narratology' was a major factor in defining the boundaries between immersion and narrative in film and game-play. Allen Varney gave his views as a game designer of the time, rather than a humanities academic. Varney, 2006 p.1;

> Playing your own favorite game, did you feel caught up in a compelling narrative, the way you'd be mesmerized by a terrific book or movie? It felt like that, didn't it?
>
> Except it didn't, really. When the game ended and you returned to reality, you felt spent, maybe exhausted, as if after a workout. In contrast, when the novel or movie ended, you probably felt like you'd awakened

> from a powerful dream. (The exceptions are horror and action stories, which can wring you just as dry as a game.) In both cases, you felt stiff, but the game immersion left you shaky for hours. Some kinds of games might have influenced your behavior long afterward. How many Quake or Unreal players, immediately after they finish a marathon deathmatch, head to the kitchen for a snack - and peer carefully around the door jamb, scouting for enemies? Are you nodding? Uh-huh. Bet that didn't happen after you watched Return of the King.

Varney here created an excellent explanation for how immersion is different between film and video games. Although, they are both moving-image based, they are different types of media. That said, film does allow for both cognitive and emotional involvement but video games take this cognitive involvement further via interactivity. This is where video games begin to differ from film, immersion in a game is to become so involved that any control over in-game movements becomes automatic. Players are also expected to solve puzzles, defeat bosses, and explore, etc. (depending on the genre), confronting a non-linear narrative through mental absorption.

Varney's description is an interesting starting point when looking at how we may begin to instigate immersion and narrative, in a video game, through audio. Weibel and Wissmath, in 'Immersion in Computer Games: The Role of Spatial Presence and Flow', identify a variety of characteristics linking to flow, spatial presence, and immersion. They explain that '[T]he characteristics of such intrinsically rewarding flow experiences are intense involvement, clarity of goals and feedback, concentrating and focusing, lack of self-consciousness, distorted sense of time, balance between the challenge and the skills required to meet it, and finally the feeling of full control over the activity' (2011, p.2). This was also described by Varney as '**Immersion**: intense focus, loss of self, distorted time sense, effortless action.' (2006, p.1), overlapping into a clear definition of immersion after flow and how we can understand useful parameters to a composition; summarised in table 4.

Immersion:	Lack of Self Consciousness	Distorted sense of time	Intense involvement (*in relation to emotional involvement)
Flow:	Full control over activity	Balance of skill and challenge	Intense involvement (*in relation to cognitive involvement)

TABLE 4: COMBINATION OF IMMERSION AND FLOW PARAMETERS. TABLE BY THE AUTHOR.

In Winifred Phillips' *A Composer's Guide to Game Music*, Phillips focuses on immersion through Brown & Cairns' theory of the three stages to total immersion; Engagement, Engrossment and Total Immersion. As seen in figure 2, Phillips initially puts these three parameters into a graph, which aids in the visualisation of the theory.

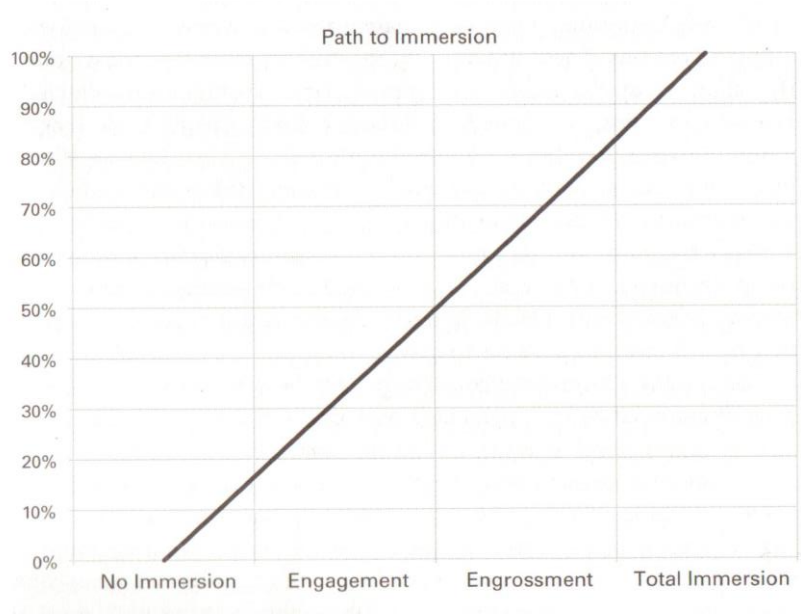

FIGURE 2: THE PATH TO WINIFRED PHILLIPS MODEL DEPICTING BROWN & CAIRNS' PATH TO IMMERSION THEORY OF PASSAGE THROUGH THREE STAGES (2014, P.39).

Although useful to the composer over the elements of game-play which must be musically addressed in order to aid total immersion, as Hennigan (2015) explains 'the question of precisely for whom the book is intended is one that remains ambiguous throughout the volume'. The book (in which is its goal) speaks mostly to the composer, guiding what may be their musical response to certain game parameters. Phillips' chapter which includes Brown and Cairns is used throughout this paper as it clearly and precisely evaluates their research, especially on a composer's level.

Chapter 3: Modelling flow and immersion

In order to identify the specific audio, visual and game parameters needed to create a sense of flow and immersion, a model has been produced to understand these different parameters. Csikszentmihalyi's flow chart gives an original focal point, a basis to represent flow outside of video game theory. Early in the research process a model was created from the theories of immersion and flow from previous chapters, showing how cyclic motion would be the best way in visualising how an interactive medium and accompanying soundtrack can form player involvement. The overall theory was that as long as the parameters within the model were met, the longer the cycle continued, and the more likely that the player would stay in a constant state of immersion; this original model is shown in figure 3.

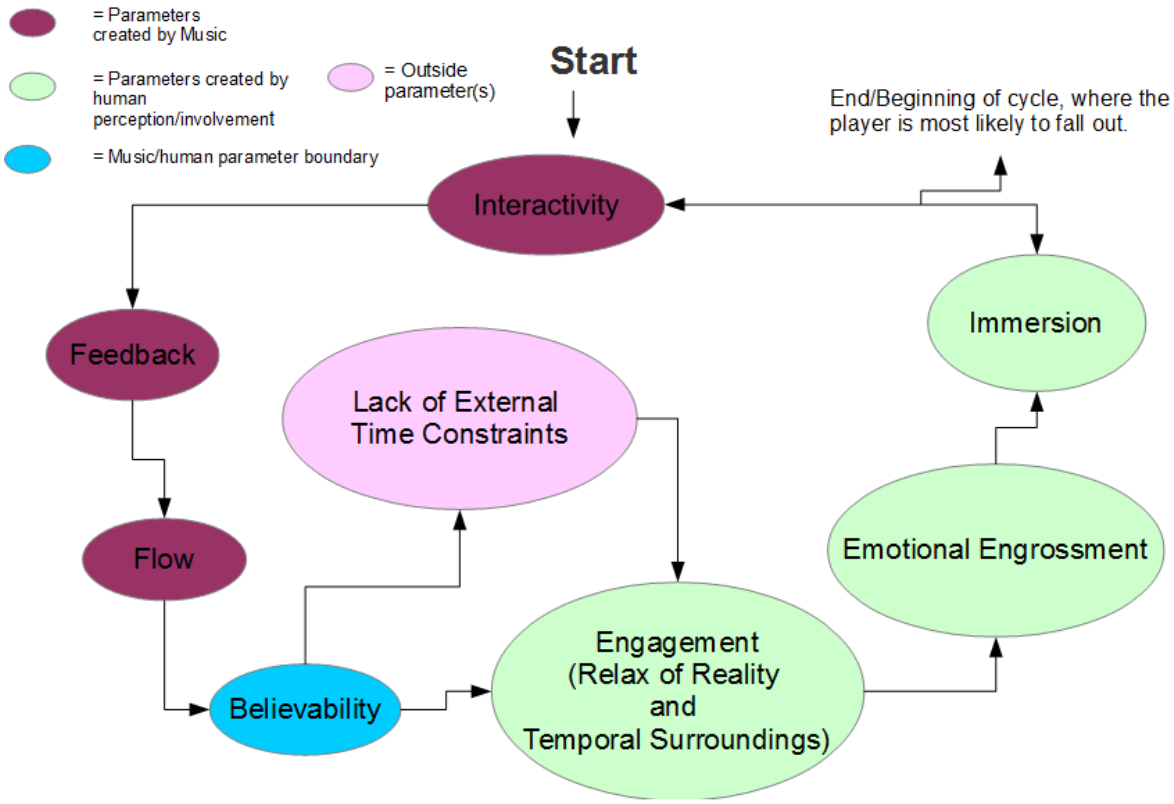

FIGURE 3: THE FIRST MODEL CREATED BY THE AUTHOR, INVOLVING MUSICAL PARAMETERS, HUMAN INVOLVEMENT, OUTSIDE PARAMETERS AND THE SEPARATION BETWEEN BOTH HUMAN AND MUSICAL ASPECTS.

The model forms its parameters from the basic points of scholarly texts, alongside crucial areas of game-play which need to be addressed, such as interactivity and feedback, with engagement and engrossment being retrieved from Brown & Cairns' three points to total immersion. A cyclic representation of these parameters was created as it was

thought to be the best way to visualise how an interactive medium forms, and how audio could be shaped inside a game world.

Figure 3 visualises both audio and game-play related parameters, suggesting that a correct correlation with the visuals, audio, and haptic responses is important to an outcome where a soundtrack can enhance flow, immersion, and player involvement. As can be seen in figure 3, flow and immersion are placed as parameters themselves, the idea being that they were needed to trigger the next parameter on the chart. However, this was not an accurate representation of these main points.

It became apparent that immersion and flow were not parameters the same as engrossment or engagement but were elements to be created outside of these successful parameters. In this, it became difficult to visualise the model in terms of a cycle, but instead became best represented by stages of player involvement.

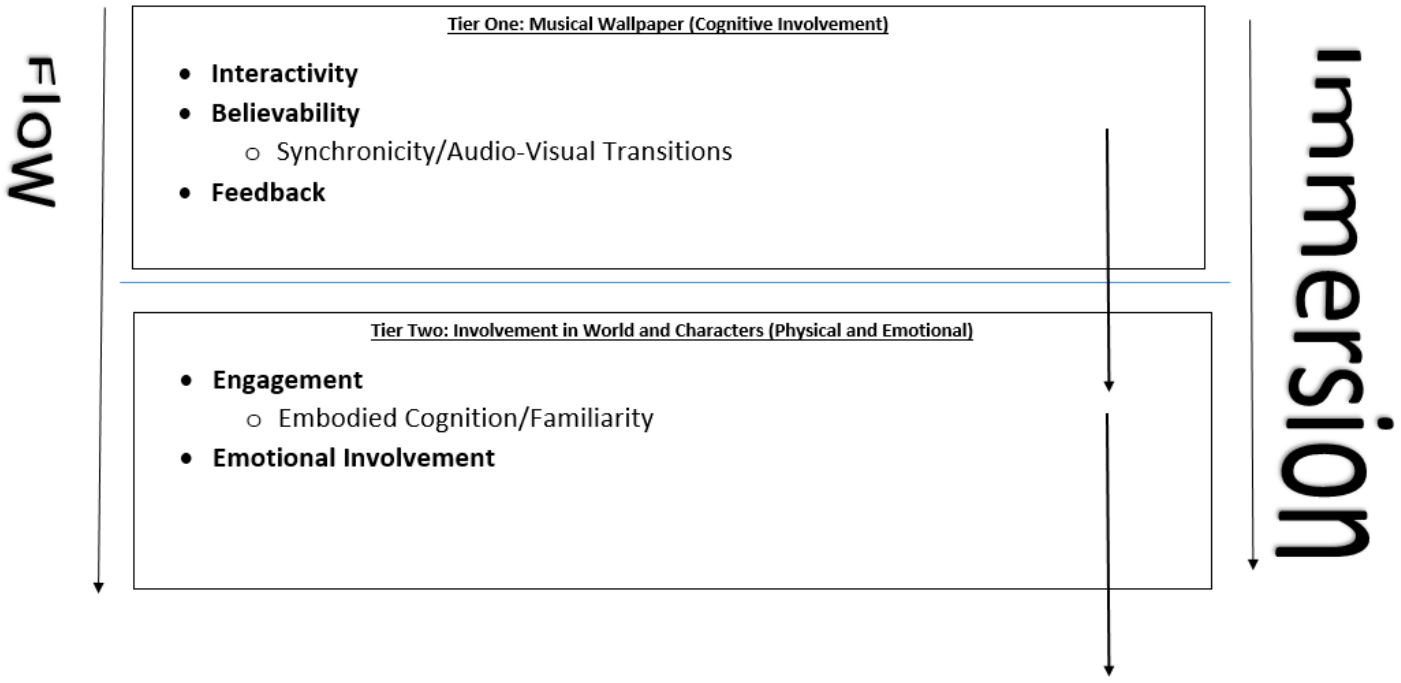

FIGURE 4: MADE OF TWO TIERS, THIS MODEL COMBINES THE PARAMETERS INTO GROUPS WHICH ARE SHOWN AFFECTED BY FLOW AND IMMERSION. MODEL BY THE AUTHOR.

The model shown in figure 4 uses a two tier structure. The first tier is formed of personal observations crucial to cognitive involvement with a game, including both what would be musical representations of game mechanics, interactivity and feedback, and a player's physical involvement through believability in a game world. This first tier would

make up a musical wallpaper, a background soundtrack and sound design used to accompany the visuals and interact with the player at a basic level, and without these parameters flow may not be achieved.

The second tier of the model applies Brown and Cairn's engagement and engrossment, with engrossment being reimagined as an emotional involvement in the game world and characters. The second tier is accessible through an effective first tier, with the audio aiming to be structurally deeper by this point and includes a player's sense of familiarity, engagement and emotional involvement within the virtual world. With flow having already been established by the first tier, the second should focus on continuing the growth of, and keeping the player in a state of immersion. As portrayed in figure 4, the state of immersion differs from the original idea formed in figure 3. It is not only a separate parameter to be created after all others have been established, but grows as each individual parameter is being established, rather than after both tiers are fully created; success and growth becoming more prominent between the boundaries of both tiers.

Currently, the model is the best way found to visualise the parameters needed for a soundtrack to address the establishment of flow and immersion. However, different parameters may fluctuate between tiers, as the model can be game and genre dependant; this particular model represents narrative RPG genres of game-play. The following discussion identifies each parameter and addresses its importance to the visual, audio, and haptic[4] relationships that occur through video games.

Tier One

'We don't just see sounds occurring: we feel them.' (Collins, 2013, p.20)

Interactivity

Interactivity, appearing from the very beginning of a video game to the very end, is the crucial starting point to successful in-game audio, being the first parameter in the model and the most important in terms of game-play. An interactive soundtrack, which includes both sound design and musical material, will point out the most basic of move-

[4] The manipulation of objects through the sense of touch; i.e. a controller manipulated by the player in order to move an on-screen character.

ments that the player needs to learn for any game, such as how to walk or swing a sword, explaining the basic mechanics in the early game on a mostly subconscious level. Through competent interactivity and audio reaction to player progression, flow will begin to form through audio and haptic connections, aiding later familiarity and comfort among the game-world through accessible feedback and enjoyment.

Interactivity is the aspect of a video game which makes the medium different to film and television. Films can be seen as linear, the moving image set through actor scripts and written narratives with the audience hearing pre-composed audio already set to the image on screen. The audience has no control over what is going to happen on screen which could also be said for video games, as the story and where the player is eventually going is already set. However, through its player participation and interactive character control, game-play pacing and non-linear environments, video games are directly affected by the player and their player character (PC) actions, rather than being a viewer of someone else's story.

When attempting to encourage interactivity in game audio, a composer must create sound design and music that acts as 'the sonification of player-generated events' (Collins 2013, p.32). Collins, one of the leading academics involved in the research of video game audio, argues that interactivity stems from player involvement through the active triggering of in-game events, alongside the general movement of their character and narrative; subsequently, a lack of information both visually and sonically would misinform the outcomes and emotions of player actions.

Being part of the first tier, interactivity aids future engrossment of a player with their character, for Collins (2011, p.40) states that interactivity in particular contributes to anthropomorphism, giving feedback to the actions of the player and through our attribution of cause, creating an intent of movement for an avatar/character, humanising game characters. This is from the viewpoint that if a human interacts with an object, they will imply that the object has intentional movement, becoming humanised and subsequently given emotional value. In video games, players interact with their personal avatars on a haptic, visual and audio level, however the haptic portion of the interaction is created through the use of an interface, like a computer mouse/keyboard or game controllers. Due to this loss of senses such as smell, touch and taste, the virtual world becomes accompanied by audio which will interact with the PC, giving their movements a sense of purpose through character imitation in the audio.

Believability

Believability is a term not often used yet is ideal in understanding how a soundtrack can create flow in a game world. This parameter takes from interactivity and uses audio techniques to disguise issues like creating heavy player interactivity whilst being subtle and not breaking a player's cognitive involvement in the game.

'The importance of believability is a concept found in the earliest surviving work of literary theory… If believable, probable action is such a fundamental principle of literature, how does the artist reach beyond the confines of the natural world to tell a more fantastical story? Suspension of disbelief makes this possible' (Phillips, 2014, p.36). Phillips links believability with the suspension of disbelief. This type of player involvement is when a player can suspend their knowledge of real world logic and believe what would be unbelievable, for the sake of becoming involved in a game. This is the aim of believability, to create a soundtrack which can fit in with a game environment so that the player cannot sense any disruption to game flow, as Berndt (2007, p.4) states, if a collection of sounds 'emanates coherently from the musical flow, it will still sound believable'.

Synchronicity

Synchronicity between audio, visuals, and player interaction is important in creating a believable game world through a smooth connection between gameplay and sound. In order to create believability through synchronicity, audio as a whole needs to match with the visuals and what a player might associate with certain objects on screen. For example, *Ratchet and Clank* (PS4, 2016) sees a small cat-like protagonist (Ratchet) and a small robot (Clank) traversing planets, attacking Blarg (antagonist) enemies, and smashing crates to gain bolt currency. Matching Ratchet's actions of destroying crates and enemies with a variety of weapons, ranging from a flame-thrower to a Psycho-Launcher, would be impossible if the sound engineer was to try and record real sounds. This is where Chion's idea of synchresis becomes appropriate, as synchresis allows for a variety of dubbing and post-synchronisation of different voices that could possibly be used to join visuals and sound (1990/1994, p.63). Originally applied to film, this terminology can be shared between different media and can be especially effective applied to animation (like *Ratchet and Clank*), joining visuals with representative sounds that supports items, environments, races, cultures, etc. which do not exist in our own world. Having a sense of synchresis between visual, audio and the action of the player/character

will allow sound designers to imagine sounds that are similar to real world sounds, yet fit the sound world and soundscape of the game.

Transitioning

Transitioning is a common problem interactive media has when trying to keep flow in immersive virtual environments, something that has been touched upon in Berndt's 2006 'Composition and Arrangement Techniques for Music in Interactive Immersive Environments'; a problem related to both the parameters of believability and interactivity. The transitioning between different visuals, events and musical material is important to the musical wallpaper of a game, moving with the changing visuals through different environments, moods and continuing with the narrative of the game. In film, transitioning between different on screen images causes an issue in keeping synchronicity between visuals, the soundtrack and sound design. In video games, the transition between visuals, the soundtrack, sound design, and where the player is, or what they are doing, needs to be synchronised; the audio needs to be synchronised to the player's movements rather than only the visuals.

Composers use a variety of compositional techniques in order to keep flow in their video games, including the use of fading between musical materials. When applied to video games, a fading transition can be subtle enough to diffuse any hard cuts of music between certain areas of a game, such as different environments, in which the player can travel and move around. As can be seen in figure 5, RPGs offer a wide variety of scenes, environments, and characters for the player to explore and interact with, which means the composition usually has to adapt its identity to fit with different areas.

FIGURE 5: IMAGES FROM TWO DIFFERENT AREAS OF *NI NO KUNI*. LEFT: SHIMMERING SANDS (NEOCARLEEN, 2014). RIGHT: ROLLING HILLS (JALBOR, 2012).

This causes issues in certain games, such as Ni No Kuni: Wrath of the White Witch, a Japanese RPG from 2010. A soundtrack needs to be able to transition between material to give a sense of flow and continuity in the narrative. However, Ni No Kuni can be seen reusing its material, even between two drastically different environments as seen in figure 5[5]. Although transitions can possibly cause hard cuts and a loss of flow in the game, if music is reused between completely different areas a player can become easily bored through similarities.

However, what keeps a player from boredom can also cause asynchrony, with the new audio interrupting the previous musical material with very little rhythmic and harmonic and similarities that support the continuity of the soundtrack. To increase believability, flow and thereby immersion, *"hard cuts"* between separate audio need to be accounted for and removed within game elements, something that Berndt has touched upon by presenting new compositional and arrangement techniques, believing that '[T]hese *hard cuts* destroy inner musical structures that we are used to hearing and thus eventually break the game's atmosphere' (Berndt, 2006, p.53).

Interactive game music has a basic rule of transitioning with cues in order to blend with other music cues and create a sense of flow, as these will be triggered by player actions, which will then appear as interactivity to a player (Marks, 2009, p.234). Again looking into Marks work, he believes that it is essential for game soundtracks to be able to change with the flow of the game by the player; changing between walking/running, i.e. getting faster in tempo; tension when anticipating danger for the player therefore making them cautious/worried/etc.; dread when a boss/danger presents itself; battle music to psych the player; dark when the player becomes overwhelmed by the boss (usually also representing the end of the fight); second wind of character/player flurry in music to tell them it's near the end and to keep them going; final 'win' music (Marks, 2009, p.234). A successful soundtrack leads to a seemingly higher quality of game, even if the game is not. Higher quality sound design and instruments are able to trick a player into believing the visuals are parallel in quality, making a player more likely to engage and interact with the visuals, forming a better quality of immersion. This is seen as adaptive audio rather than interactive audio or, adaptive-interactive audio. 'The difference is that instead of responding to feedback from the listener/player, the audio changes according to changes occurring within the game or playback environment' (Collins, 2007, p.2)

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[5] The same material can be heard from both links. (heorotlinea, 2013)
https://www.youtube.com/watch?v=PWUbiqhxnXk (Shimmering sand music)
https://www.youtube.com/watch?v=YfnK-ePycQA&list (Rolling Hills from 00:07:52)

Feedback

In terms of the model, I feel that the previous parameters have established solid flow in the game by this point, however I feel that feedback still belongs in the first tier for it being valuable to the musical wallpaper/musical background of the game.

Musical feedback moves one further than interactivity by explaining the outcomes of a players actions, be it good, bad or indecisive, teaching the player the better way to go next time. Bad, or non-existent musical feedback causes confusion and a lack of future reaction from the player, causing the game mechanics to be more difficult to pick up and achieving its greatest effectiveness, breaking engagement from the game through a lack of understanding, and therefore the ability or wanting to continue or complete the game. 'Playability is the instantiation of the general concept of usability when applied to video games, and it is determined by the possibility of understanding performing the activities required to win the game' (Fabricatore, 2007).

Having already discussed synchronisation between audio and visuals in creating a believable game world through Chion's synchresis, video game synchronisation can be taken further as it also has to deal with giving feedback to a player through interactivity synchronisation. 'The synchronicity of the response helps players to understand the consequences of their actions, reducing the learning curve of the game and providing valuable feedback' (Collins, 2013, p.33). Through interactivity, the player has already learnt the game-play mechanics and how to effectively fight and navigate the character through the world. Feedback is established from the consequences of these actions, especially in areas of narrative and emotional content that are set-up within the game world. Karen Collins (2013, p.32) identifies this as Kinesonic synchresis:

> Interactive sound in games is kinesonically synchretic: sounds are fused not to image but to action. In other words, interactive sound is event-driven, and the sound is controlled by an action or occurrence that is initiated by the game or by the player. A player-generated event is an event that the player initiates (for instance, by clicking a mouse or by pressing a controller button). Interactive sound in games is primarily the sonification of player-generated events where the player initiates an event and there is a system-controlled (game-generated) sonic response.

However, if synchronicity (when summarised) is to follow player generated events, it must also eliminate boredom, give accurate feedback and a realistic sonic atmosphere (Collins, 2013, p.37). Therefore interactive sound may become predictable to the player, developing boredom and non-concentration when the game is trying to feedback action and consequence to a player. A way to keep a player engaged with sound is to create randomisation in the composition, so that interactive sound is not always predictable This itself has issues however, Collins (2013, p.34) demonstrates that randomisation cannot be completely random and unplanned in itself, for 'randomization increases believability of the scene, but any sound that is too distinct can call attention to the artificiality of the sound' (Collins, 2013, p. 34). In order to effectively feedback to a player without losing flow and interest in the game, it may be useful for certain soundtracks to rotate feedback sounds, so that the player knows what it means but is not hearing the same tone throughout the game.

However, it would be wise for music to not spoon-feed or overload the player with intense audio direction i.e. if they are near a secret area and the music reacts to this before the player has a chance to find it themselves. This allows for less of a randomisation of certain sounds but they are used sparingly over the game. Audio representation of feedback should engage a player by forcing them to use their own initiative, with sound only as an aid, and should reward a player with a musical sign when they have made a difference in the game world. For example, the *Final Fantasy* franchise includes a victory fanfare[6] after every major boss (not every fight in the game) which, for those who play through more than one game, is a sign of success and the reward is accentuated by the music.

Although feedback may sometimes be blatant in its sound design in giving a sense of movement, i.e. clashing of swords, footsteps, sometimes a player only needs a subtle nudge in the right direction, for example, in areas which a player may become stuck or need some form of guidance which is not gained from the visuals. By creating this subtly in the soundtrack, the game will not lose flow from becoming bored or irritated by not knowing how to progress in a level/area, and will instead be gently pushed forwards and able to continue with the game through small hints.

Gamer's Preference

[6] Victory Fanfare from *Final Fantasy*: https://www.youtube.com/watch?v=-YCN-a0NsNk (Cloud183, 2008)

It is worth mentioning what Brown and Cairns would call 'the gamer's preference' (2004, p.1298). The gamer's preference is a small disclaimer for player immersion, as a game which could be engaging for one player could not be for another, it all depends on a player's preference of game mechanics, visual style, audio style, and most importantly, the genre. What one player enjoys another might bounce off[7] before the game can create the foundations for flow or immersion. As Brown and Cairns (2004, p.1297) explain it, '[T]he experience of immersion is often critical to game enjoyment and is made or destroyed by game characteristics.'

Tier Two

The parameters informed by the first tier are assumed to establish themselves at the beginning of a game, during the tutorial, or through a first play-through, as Calleja admits that '[D]uring the first few hours of playing a new digital game, you adapt yourself to the game's mechanics, physics, and rules' (2011, p.181). This is where the second tier differs, it is less related to a part of the game but the physical and emotional involvement that a player may achieve in a game world, achieved by flow, and usually occurs after a certain amount of game time has passed. The following paragraphs are influenced by Winifred Phillips' interpretations of Brown and Cairns' 2004 research on Engagement, Engrossment, and Total Immersion.

Engagement

Engagement, as will be described in this paper, is the physical involvement a player will have with a game world, described by Brown and Cairns as a 'willingness to invest time, effort, and attention to the game' (Phillips, 2014, p.40), including the sub parameters, broken down by Phillips, seen on the far left column of table 5.

Sub-parameters

[7] Bounce off: A common term used for when someone only plays a game for less than an average play-through time (approx. less than an hour), not enjoying most aspects of the game and will not be likely to pick it up again.

	Initial Emotional Reassurance	Strong Visuals	Attention
	Navigational Assistance	Interesting Tasks	Empathy
	Gameplay Identification	A Compelling Plot	
	Time Perception		
The Path To:	**Engagement**	**Engrossment**	**Total Immersion**

TABLE 5: PHILLIPS' SUB-PARAMETERS AFTER BREAKING DOWN THE COMPOSITIONAL ELEMENTS NEEDED TO CREATE ENGAGEMENT, ENGROSSMENT AND TOTAL IMMERSION. TABLE BY THE AUTHOR.

Karen Collins' *Playing with Sound* approaches the topic of bodily engagement in video games, applying and giving an example of this through the game *Papa Sangre*; a 2010 popular iPod/iPad audio game that relies on binaural audio technology to create a spatial environment in the player's headphones. Without using their eyes, players navigate through tapping on feet on-screen, with the game's story is told only through sound. Hereby, this engagement of the body adds a dimension of involvement for a player as the story cannot unfold without that involvement (Collins, 2013, p.24-26). The point Collins makes is that the sound takes over the visuals, but due to visual and haptic association, through synchresis of sound and action, a player may still associate images with the sound. We can, therefore, apply this theory of being engaged through physical involvement to games with a player character, visuals, and regular controls (Collins, 2013, p.26).

In narrative, action-adventure RPG style games such as *Ratchet and Clank* (2016); *Transistor* (2014); *Okami* (2006); *Ori and the Blind Forest* (2015); *Don't Starve* (2013); *Ni No Kuni* (2010); *Stardew Valley* (2016); *Bastion* (2011), the player unfolds the story with their involvement through the medium of a controller. The player can do this through a medium (controller), much like *Papa Sangre*, which can cue story based cut scenes, trigger enemies by their PC being close/in sight, or getting into battles through certain movements. This trigger works back to Chion's synchronicity, approached in the section on Believability, linking now to Tagg's semiotic-based definition of 'sign' as a unit of musical meaning, where a visual is represented by a sound or musical event (2012, p.155)[8]:

[8] It is worth mentioning that Tagg is just one formulation of musical semiotics, as there is a huge amount of work on this area (and not just on music) which cannot all be identified in this paper.

> Meaning, in the sense of one thing conveying, indicating or referring to something else, is a recurrent concept in this book. Signification, treated here as a virtual synonym to meaning, contains the morpheme sign. Sign simply means a thing indicating or representing something other than itself.

Synchronicity, when applied to video games, enhances Tagg's notion of a sign, as we can synchronise a sound to a player's action or something that has been triggered by the PC, rather than just a visual synchronisation; some examples can be seen in table 6.

Interaction:	Button press to attack an enemy	Smash a box	Jumping	Holding forwards
Sign (sound of):	Enemy being hit	Box smashing	Character noise	PC footsteps

TABLE 6: EXAMPLES OF HOW SONIC SIGNS MIGHT LINK TO PLAYER INTERACTION. TABLE BY THE AUTHOR.

The significance of synchronising a sign from a player's action rather than only visuals, is that it enhances a player's engagement with the game world. Everything that a player could possibly do will be sonically fed back, just like with Papa Sangre, but with the introduction of visuals and a PC can be strong in helping the player feel as though the PC actions are their own, through the controller, and having a physical[9] engagement with the game world. This ties in to player presence, or spatial presence, in the world which is the sense of being in a place. Engagement can also be described as a sense of presence in a game world, a topic that will only be lightly touched on here, but that does have value in its relation to immersion. Calleja, from the beginning of his chapter on immersion pairs presence and immersion in 'Presence Theory' (2011, p.18). Presence is about form, the extent to which the unification of simulated sensory data and perceptual processing produces a coherent "place" that you are "in" and in which there may be the potential for you to act' (Slater, 2003, in Calleja, 2011, p.20).

Embodied Cognition

In Karen Collins' 2011 article *Making Gamers Cry: Mirror Neurons and Embodied Interaction with Game Sound*, she refers to her collection of research into mirror neurons and embodied cognition, which explains how a player may become present and physically involved in the game world, building on Calleja's research of 'presence theory'. Col-

[9] Physical: When game mechanisms and control systems (controllers/mouse and keyboard) are natural enough to the player that they do not need to think about their own movement in order to move their in game avatar.

lins (2011, p.40) believes that mirror neurons respond as though we are performing an action which is actually performed by another, which may be responsible for a player feeling as though they themselves are moving on-screen, as they can both see and control movement through their player character. This explains the moment when a player can move their PC without being aware of the medium, losing the sense of the controlling device and screen as it becomes an extension of the player's body schema. Collins goes further in explaining Keyser et al.'s discoveries, through identifying monkey mirror neurons, that the brain responds to sound as well as sight; 'when the monkey hears the sound, the brain responds as if it is also seeing and experiencing the action' (Collins, 2011, p.40). However, if a sound is heard without the action being experienced beforehand the experience is lessened, for 'our perception is always coupled with a mental re-enactment of our physical, embodied experience' (Collins, 2011, p.40). Tagg's notion of signs in synchronisation with player actions and visuals could be used to allow immersion in a game world through manipulating a player's mirror neurons and re-enacting a player's own experiences of in game actions. This combination of research, when applied to a composition, will allow a player to physically remember how to effectively control their PC in a game through different playthoughs, and possibly through different games of the same genre, allowing the player to lose the sense of their controller and become physically immersed in the game world. A player's physical being in a game world can also activate emotional involvement, as successful game involvement, by conquering the barrier of game mechanics, '"can facilitate a user's identification with the characters 'body' as well as provide the groundwork for empathy"' (Morrison and Ziemke, 2005, cited in Collins, 2011, p.40). Collins (2011, p.40) refines this as the player integrating feelings of empathy towards an anthropomorphised character through our active mirror neurons when witnessing their actions. As we anthropomorphise these character's, player mirror neurons will be able to connect and respond to their actions as though they were "real", or at least appropriate in the game world.

Familiarity

Familiarity, like presence, is a small subsection of engagement, however it is one of the main factors relating to engagement in the game world. Familiarity will be described in this paper as player comfort from being in a game world through representation of senses.

Collin's (2011, p.42) identifies Cardinali, Brozzoli and Farne's work, who argue:

> [A]uditory information falls into the peripersonal space, and therefore is an extension, rather than becoming part of our body schema (an incorporation). In this way, it could be said that in games, sound extends our sense of self beyond our physical body and into the intermediary space between ourselves and the virtual world. Sounds that we make– including in the virtual world– become a sensory extension of our self into that virtual world.

However, as a player, any auditory information received is a reaction to, or an identifier of, a player's movements and actions, or being in a space which is allowed through the extension of our body schema. Sound, therefore, must act as a replacement to the senses we lose when playing video games whether fully synchronised or an abstract interpretation (depending on the genre of game) in order to physically engage with an audio, haptic, and visual world. This ranges from sound design in representing objects, movement, actions, to a soundtrack which synchronises, or interprets, player involvement. Incorporating this sonic, haptic and visual relationship into a soundtrack will allow for a variety of senses such as smell, touch, and taste to be represented through audio information which should, with mirror neuron research, identify familiar senses for the player.

We can relate familiarity back to interactivity and the anthropomorphism of the PC and other characters through interactive sound. The anthropomorphism of characters in a game allows for players to grasp an "understanding" of emotions and personalities that are placed within a game, 'we can use the knowledge of our visualizing causality and intentionality of sounds to better express the character's emotional state, so that the sound/music is more likely to impact upon our own emotional state' (Collins, 2011, p.40). This can also be applied to any speech or narrative added to the game as, if it is appropriate voice acting, a player is able to focus in on different character personalities. If a voice actor identifies their voice as that of the PC, then this can be seen as a sound that we make in the virtual world and would be a sensory extension of our being, as the sound would represent the player's character. In terms of a story narrative voice, this would work differently to that of a voice outside of the PC and the player's perceived sound world. Chion argues that if voiceover commentaries (what he refers to as textual speech) were to be in control of narration, there will be no autonomous audio-visual scene or any spatial and temporal continuity, and any realistic sound will be at its mercy (1990/1994, p.172). However, applying this to interactive media, in which continuity is defined by where and when the player wants to go in the game world, means that voiceover commentaries can be

powerful when introduced and focuses the player on story narrative, rather than the player only being aware of their own game-play.

Familiarity is bordering between engagement and engrossment in the second tier, with synchronisation allowing the player to feel as part of a being in a world, due to action and consequence in the sound world. Familiarising with voices in a game can enhance how comfortable, and genuine to itself, a game world feels to a player engaging with it, but also their connection with the narrative. Therefore emotional involvement, and an engrossment in the game world via characters and cultures, becomes important here.

Emotional Involvement

Emotional involvement is the player's investment with the beings/characters of the game world, and would occur after the player is automatic in game-play, and the learning curve is no longer distracting to the environment. Emotional involvement of the player can often be achieved through thematic representation of characters throughout the game, which can be significant to the player. *Undertale* (RPG, Toby Fox, 2015) is an excellent example of a soundtrack which incorporates character themes and uses the material to identify relationships between the PC and other characters. The effects this has on emotional involvement, even outside of the game, can be seen in table 7, as players can be seen to have passionate emotions towards the game. For example, listening to Asgore's theme prompted *Hawns3211* to identify with the character and their actions and connections with the game world, whilst Fentiman became emotional at the track which represents 'home' in the game world.

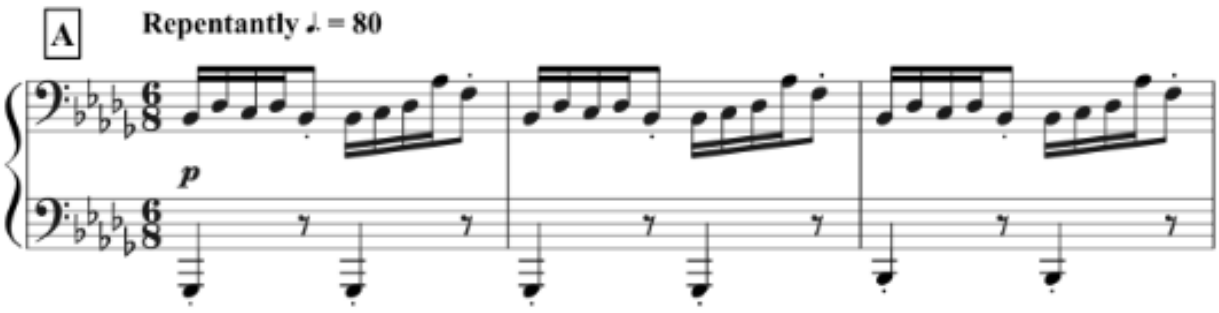
User	**Comment**	**Track**	**Link**

Hawns3211 (2015)	Asgore is easily the best character. He wants to save his people but must kill humans to close the barrier. This song is good, and shows his commitment and that he is trying his best. Asgore tries to get you go come to him as whenever you die he tells you to stay determined. He also destroys the mercy option because he knows he deserves no mercy from you for what he has done.	Undertale OST - Bergentrückung (Intro) + ASGORE (Elu Tran, 2015).	https://www.youtube.com/watch?v=pcamjcoRmrQ
SenpaiShin (2015)	I still tear up a bit when I hear this...	Undertale OST - Hopes And Dreams (Intro) & Save The World (Elu Tran, 2015).	https://www.youtube.com/watch?v=lGaneyDfyls
Evan Czarkowski (2015)	I... REALLY.... NEED.... TO.... PLAY.... THIS.... GAME....	Undertale OST - Toby Fox - full album (2015). (Panos Music, 2015).	https://www.youtube.com/watch?v=RQmwG6Y78Hc
Fentiman (2015)	'Home' always makes me cry for some reason	Undertale OST - Toby Fox - full album (2015). (Panos Music, 2015).	https://www.youtube.com/watch?v=RQmwG6Y78Hc

TABLE 7: PLAYER OPINIONS OF THE GAME MUSIC, LISTENING ON YOUTUBE BOTH AFTER AND BEFORE PLAYING THE GAME. TABLE BY THE AUTHOR.

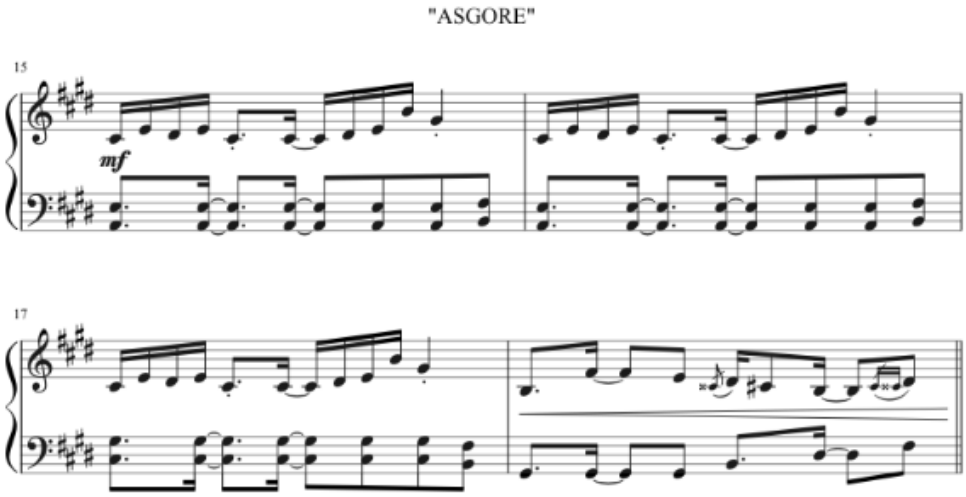
This high level of emotional involvement, even outside of the game, can be brought back to a soundtrack which identifies so clearly with the game world, its culture, and its characters that when listening individually to tracks, it is hard for an audience to not remember their time as a player. Brown and Cairns' (in Phillips, 2014, p.45) research brought them to a similar conclusion, identifying that music affects the activity of the brain in ways that have a direct influence on how we visually perceive the world around us. Therefore, if we are listening to a track outside of a game which, in game, may change the emotions of listeners from happiness to fear, we may visually perceive and become connected with a world which is not currently in our field of view. Although outside of the game world, a soundtrack can be perceived as successful in creating a higher level of emotional involvement, engrossment, and a decreased sense of self-awareness (Philips, 2014, p.44-5), especially when the music is remembered, sought out, and played; the player is in the game world without having to play the game. This is encouraged in *Undertale* fans through its use

of themes for different areas and characters, and although this can be criticised as "track based" as opposed to a through-composed soundtrack, the material interlinks between early game and later game. The player can eventually see all overarching relationships between characters through the musical material and its connections with the story, linking it all together in a very modern way. For example, one of the first major characters that the player meets, Toriel, is associated with a semiquaver pattern as can be seen in example 1.



EXAMPLE 1: TORIEL'S THEME "HEARTACHE"[10] (FOX AND JESTER MUSICIAN, 2016).

Example 2 then shows the theme for one of the later characters the PC meets, Asgore.



[10] https://www.youtube.com/watch?v=LR9i1WQK-iU from 00:01:21 *Heartache* (Toriel's theme) can be heard (The Dashing Wanderer, 2015).

EXAMPLE 2: ASGORE'S THEME[11] (FOX AND THESILENTMAGUS, 2015).

As can be seen, the semiquaver line of Asgore's theme is very similar to that of Toriel's, with a few minor differences in dynamic, rhythm and pitch. We eventually learn that Asgore has an ex-wife, Toriel. It is sometimes not until the player returns to the music after their first play through that they hear the connection between the two themes (and also fight music) and the obvious connection that once was or still may be with the characters. This level of detail in the soundtrack can help the player identify with characters and hopefully subconsciously to make links and engross themselves in the relationships given by the world[12].

Chapter 4: Case Studies

Previous chapters have discussed a variety of parameters from the model which can be used to create both flow and immersion. The model will be applied to two case studies, *Transistor* (Supergiant Games, 2014, composed by Darren Korb) and *The Banner Saga* (Stoic, 2014, composed by Austin Wintory), and will examine how their soundtracks are used in the game world. Both case studies are situated in the RPG genre and will show how the model can be applied to the games, how the soundtracks could be improved, and which aspects were more successful. Both games deal with culture and environment (place) in the visuals, audio and narrative however, both are portrayed in different, unique ways.

Transistor

"Hey Red... we're not going to get away with this are we?" This is the first line of speech before any musical material sounds, the consciousness of a man narrating from within a sword-like object held by a woman, later to become the player character. The game recites probably its most famous line, only after the player is coaxed into pressing a button on the keyboard or moving the controller, occurring whilst the player is fixated on the image in figure 6. This triggers a low bass sound as the speech begins, immediately dissipating as a guitar begins a simple, yet repetitive, melo-

[11] https://www.youtube.com/watch?v=Eqypnw6gQNg specifically 00:01:51, Asgore's theme can be heard (Fasgort, 2015).
[12] This is similar to the leitmotif-style in film musicology (Chion 1990/1994, p.51), where character themes are heard frequently in the orchestral score to represent characters, their changes and variations.

dy. A few moments later, a steady drumbeat accompanies the melody which adds to the already fast paced narrative. This is all accompanied by the narration of the man within the sword, yet the music lacks any vocal harmonies in response; the tone is now set for the world of *Transistor*.

Game Background

Transistor is a 2014 Action-RPG, situated in the culture of a sci-fi virtual world, developed by Supergiant Games with music composed by Darren Korb, in the genre of what he describes as "Old-world Electronic Post-rock." (Korb, D., personal communication, March 9, 2016). For the entirety of the game the player has control of the main character named Red, a famous popular singer who has mysteriously lost her voice and wields a sword like object called the Transistor; the Transistor has the voice and personality of an unknown man, who we see impaled by the sword at the beginning of the game.

FIGURE 6: THE FIRST IMAGE THE PLAYER SEES IN THE GAME WHICH INCLUDES RED, THE TRANSISTOR, AND THE UNNAMED MAN. SCREEN CAPTURE BY THE AUTHOR.

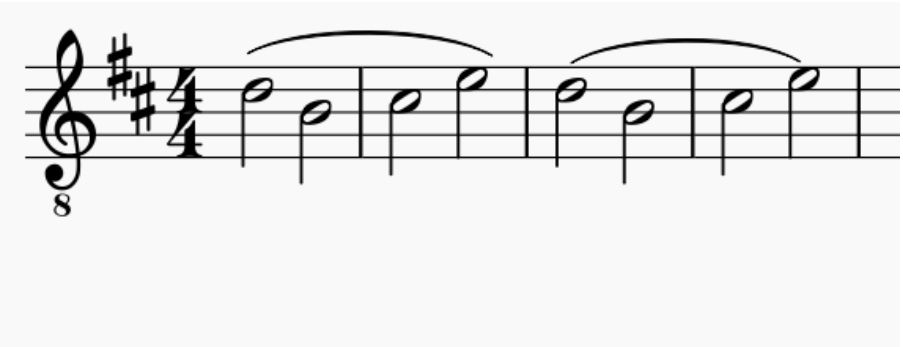
The story is mysterious to begin, as the game starts at a time just after Red has been attacked by a group called the Camerata, a government which regulates, maintains and stabilises the city of Cloudbank. With aid from a robotic force called *The Process*, which appears as a collective antagonist, the Camerata attacked and reduced influential individuals when in the possession of the Transistor to actively avoid any change that could be made to the culture

and daily running of Cloudbank, trapping their consciousness inside the sword (The Camerata, n.d.). Admissions of guilt from the Camerata can be seen throughout the game:

- 'This is a formal admission of guilt. I solemnly swear everything written here is true. Know that I am responsible for these heinous acts perpetrated against the city of Cloudbank. My accomplices are Sybil Reisz, Royce Bracket, and Grant Kendrell. We alone are to blame. Perhaps our worst sin is you will get no justice. For now, we all share the same sentence.'
- "When everything changes, nothing changes." --*Camerata creed*
- "Everything we did, everything we're doing is for Cloudbank."

Musical Background

Darren Korb is an in-house composer for the game company of *Transistor*, Supergiant Games, and had previously composed for the 2011 video game Bastion (Supergiant Games). Korb explained that the composition needed to take a unique process in order to create a soundtrack that had a different idea of tone to Bastion, wanting *Transistor* to have its own identity, and therefore taking six months to find the tone in which he could set the game. This came to the creation of *Old Friends*, a guitar solo shown in example 3 and the first theme to be heard in the game, which is the idea that Korb centres the rest of *Transistor's* audio around, including the mood and tone of the game worlds. The only available scores are transcripts by either Dana Haynes or myself (for this paper only) as Korb only records his ideas. (Korb, D., personal communication, March 9, 2016)



EXAMPLE 3: OLD FRIENDS.[13] THE FIRST THEME TO BE HEARD IN THE GAME ON GUITAR. TRANSCRIPTION BY THE AUTHOR.

The game's plot does not particularly focus on the loss of Red's voice, this knowledge is not divulged to the player at the beginning, but almost half an hour into the game. The story focuses more on the city and the current disappearance of the population which means that Cloudbank, its culture and its people appear to be more important to the player character than their own situations. This appears in the foreground whilst the player is also trying to find out about the man who we see impaled with the Transistor in the opening shot of the game. We don't find out much about the man throughout the plot however, we figure that he is somewhat connected and close to Red by the familiarity in his speech. From here, different aspects of the game's audio will be separated and pinpointed in order to show how the music portrays the importance of Cloudbank's culture alongside the characters' own plights, and how it increases both physical and emotional involvement for the player.

Narrative Vs Mutism

Transistor is one of few games that relies heavily on story based narration which does not come from the PC or prompted by pressing a button to talk to someone. Much like *Bastion* (2011) and *Ratchet and Clank* (2016), a voice over narration is a focal point of the game and, contradictory to Chion's point about loss of continuation (1990/1994, p.172), does a large amount of telling the game story and causing a feeling of continuation in the sub-plot.

Before analysing the musical aspect of the game's audio, it is important to look at how *Transistor* works with the aspect of a voiceover-led narrative. The voiceover is given by the Transistor and the personality of the unknown man's consciousness inside, already involving the player in the game world through intrigue as to why their PC's only weapon is speaking. There is a reason for this intrigue however; mutism is the main aspect of the player's character, with the player never hearing their moveable avatar speak. Mutism is a very frequent and normal decision developers have made for a PC, however our PC has a name, a personality, and a previous life; most silent PCs allow the

[13] The full *Old Friends* track can be found here: https://www.youtube.com/watch?v=ql8K3KJyWgY (Supergiant Games, 2014a)

player to reflect their personalities onto a blank slate and create their own characters in looks and being, i.e. in massively multiplayer online role-playing games (MMORPG) like *World of Warcraft (WoW)*.

As previously stated, Red has lost her voice to the Transistor, and the only vocalisation in the game is given through the voice of a man trapped inside the Transistor, and the voices of the antagonists. One of the main ways for a player to interact with, and become emotionally connected to, their playable character(s) in a game is through the use of vocality, as a player is likely to hear human voices regularly in their day to day lives, making it easier for a player to identify a voice in a game over other sounds. Hereby, vocality is usually introduced especially in longer story based games where the player becomes part of that character. Without this vocalisation from the main character, it therefore may be difficult for a player to become involved with Red, through this lack of a natural human response. This is where the game uses the voice of the man trapped inside the Transistor, to replace this loss, giving the player a feeling of reality to the game, especially working well as the player also has connections to the Transistor as it is the weapon that they use through the whole game, so engrossment can still be achieved.

Transistor's narrative has to work hard to create anthropomorphism within the game, as Collins states 'we experience vocal sound in terms of our own embodied experience of similar sounds: we mentally mimic the voice in our own body' (2011, p.44). To apply, the human mind finds it easier to pick up on speech, being able to understand connotations in the vernacular and the player being able to apply this towards what they are hearing during the game.

Voice over narration is also used as audio feedback for the player, interacting with, and reacting to the player's decisions in both battle and non-battle related scenes, an example of this interaction can be seen in figure 7. Acting as feedback due to this lack of vocalisation in the main character, and lack of sub-structural changes in musical language, unless between areas, the narrative indicates (sometimes through sarcasm) if the player has correctly solved a puzzle or whether their attack sequences are either smart or damaging to the player's success. It also indicates the loss of a skill/health and to different rounds of the boss fight (as they usually last in threes), which replaces the usual change of musical material to represent the stage of the fight, regularly used by composers; this removes the possibility of hard cuts and keeps flow within the game.

FIGURE 7: THE TRANSISTOR VOICING HIS OPINION ON PIZZA CHOICES. SCREEN CAPTURE BY THE AUTHOR.

Vocal works

Although the narrative does not actively focus on the loss of Red's voice, the music still pursues this and implies this loss throughout the game, introducing vocal works in relation to flash backs. *Transistor's* story is kept a mystery until the player reaches an area with posters of Red, seen in figure 8, implying that Red is popular in the culture of cloud-bank and that she has lost her voice. At this point in the game, the first sign of 'vocality' in the musical structure is introduced, with the singing voice of Red being heard for the very first time in the cue, *The Spine*[14]. This becomes a theme throughout the game, with vocality only occurring in the music during flashbacks or interactions with objects that relate to the past. This input of vocals in the music when the player is most prominently reminded of Red's past life allows for the creation of empathy with the Red, through vocal anthropomorphism and emotional involvement with the vocals.

[14] *The Spine* can be heard at https://www.youtube.com/watch?v=41tIUr_ex3g (Supergiant Games, 2014b)

FIGURE 8: THE AREA WHERE RED LOSING HER VOICE IS REVEALED. SCREEN CAPTURE BY THE AUTHOR.

The first cut scene that the player witnesses, 'Last Night' (screen capture in figure 9), demystifies part of the story that occurred before the player began the game, being the Camerata's attack on Red and the destruction of the unknown man by the Transistor. During this scene, music is more important in the game-world, becoming meta-diegetic as the character reminisces over her lost voice and compositions. The cue accompanying the 'Last Night', "We all Become", shows political weight in the game world, as the lyrics "before we all become one"[15] are a relation to the Camerata's agenda of controlling the city of Cloudbank to the point of taking out individuals that oppose their totalitarianism, identifying with the visuals simultaneously occurring on-screen.

[15] *We all Become* can be heard at https://www.youtube.com/watch?v=f9O2Rjn1azc (Supergiant Games, 2014c)

FIGURE 9: 'LAST NIGHT' CUT-SCENE SHOWS RED ON STAGE. SCREEN CAPTURE BY THE AUTHOR.

This political weight within the game and its audio becomes more pronounced as we navigate through the plot as the player eventually unlocks Red's personal biography through attack simulation choices, which explains her stance on Cloudbank, reinforced in the lyrics over the five songs that appear throughout the game. Thus, music acts as a personality device for Red, replacing her vocals with musical explanations of trends, political issues and other aspects of Cloudbanks culture.

Outside of any fight sequences, the player has access to a hum function, allocated to a certain button and when pressed a spotlight will fixate on Red and she will hum along to the music. Korb admits that the humming is included in all the tracks[16] for the whole game, but is only turned on when the player presses the hum button and Red's humming is added over the top of the original music, with louder dynamics. The first time the hum function is identified to a player can be seen in figure 10. Korb explains that Red's musical material already exists, as we have identified she comes with a past, and you are able to apply the humming to what is happening and as an insight into Red's mind and her thoughts (Korb, D., personal communication, March 9, 2016). This also allows for the player to build emotional involvement with the character, as the few time that Red's voice is heard reminds the player, like a theme, that she has lost her voice to the Transistor and the humming is all that is left.

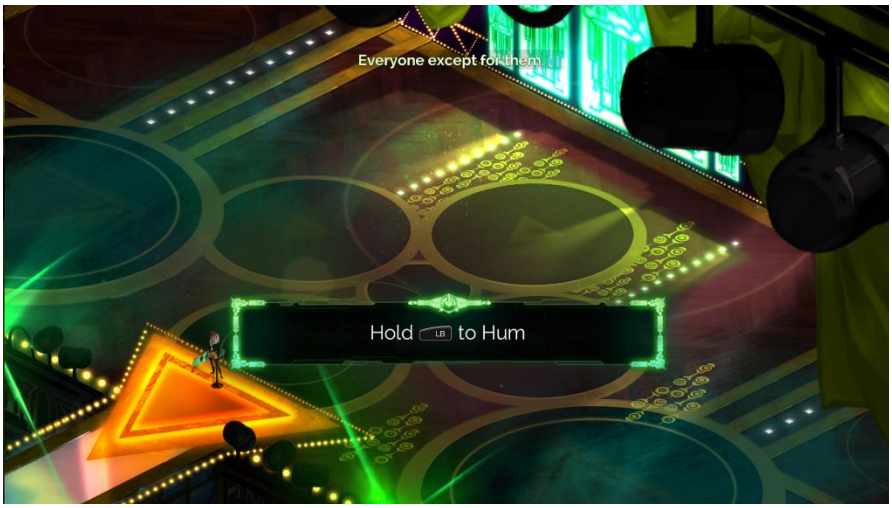


FIGURE 10: THE HUM FUNCTION FIRST DISCOVERED. SCREEN CAPTURE BY THE AUTHOR.

[16] *Old Friends* with the inclusion of the hidden humming can be found here: https://www.youtube.com/watch?v=C0Yaf25e4Zw (Gamification, 2014)

Transitions

As previously discussed, transitioning causes a huge debate when it comes to the type of audio and compositional techniques to be used in creating interactivity within the medium. A direction taken to transitioning in the game is to allow the audio to fade in and out between different the areas and their relative cues, giving the impression that blocks of audio are placed within each area. There are a few problems with this method, as the game may appear cue based rather than following a narrative, however if Berndt's opinion is followed that where the different tracks possess individual musical material, as long as the they can harmonise and synchronise with each other, then a proper cross fade can be achieved (2006, p. 55). *Transistor* blends this type of transitioning effectively by simultaneously managing multiple stems of audio within these cues, which can be manipulated by being turned on and off in real-time, reducing any hard cuts which may interrupt flow. This cleverly masks the introductions of new areas, with distraction techniques also being used by covering the beginning of a cue with the end of a line of speech by the Transistor.

This leads us to the fighting mechanic known as Turn(), which can be seen in figure 11, accessed through the initiation of a battle sequence. The introduction of Turn() causes a change in the musical material, introducing variety to the music which would otherwise be continuous, stagnant and dull, which would achieve boredom and decrease overall engagement and believability in the world. Turn() gives a sense of calm for the player in an otherwise stressful moment of the game, pausing the in-game time whilst the player queues a number of movements and attacks, which are then reproduced in double-time when leaving the mechanic. In Turn(), Korb reduces the musical material, adding low pass filters to the vocalisation of Red, as you are put inside her head, whilst matching the harmonics and rhythm of the previous audio from the area (Korb, D., personal communication, March 9, 2016). The reduction of outside influences and the introduction of vocality gives a sense that we are inside the Transistor, outside the virtual reality's own reality. The jump to Turn() does not affect the game's flow for the clever introduction of vocality distracts from the reduction of the music.

FIGURE 11: TURN(). SCREEN CAPTURE BY THE AUTHOR.

Instrumental works Synthesis v Guitar

As already mentioned, the game does not use specific hard cuts, especially in fights, to represent the progression of a fight or the overall game in general. The limited knowledge that the player gains of Cloudbank's culture leads to a subconscious narrative feedback as the player progresses through world. As we find out that Red is a popular singer, it becomes clear that popular music is part of the culture of Cloudbank at this time. So, what can be associated as 'normal' within this culture is the popular style of music that can be heard at the beginning of the game and during the flash back sequences, before the process invaded.

However, as the player progresses through the game the guitar begins to fade, seemingly replaced by synthesised instrumentation which produces material with disjunctive rhythms in comparison with the melodies produced on guitar. This provides the player with the knowledge that Cloudbank is becoming reduced in its individuality by the process as it begins to take over the city, erasing buildings and citizens, rewriting everything for their own purpose; situating the player within the meta-narrative of the game. It's not just the instrumentation that changes but other aspects of the musical material become distorted as Korb wanted to identify the process as a threat, making specific levels and moments more synthesised and distorted than others (Korb, D., personal communication, March 9, 2016). A definite rhythm in the material becomes lacking in a way which can cause distress to the player as they have lost what would be a familiar in Cloudbank, originally provided by the guitars. This causes the feeling of a loss of safety,

as though they could be attacked at any time, and provides effective emotional loss for the character, in losing this familiar sense, which is then mirrored on to the player.

Transistor shows how a composer can identify with player flow and immersion in a soundtrack, through a variety of different compositional methods. Another case study will now be introduced in order to look at how two different compositions from a similar genre may differ when identifying with a player.

The Banner Saga

The second case study comes from a similar genre to *Transistor*, a tactical RPG developed by Stoic studio and music composed by Austin Wintory. *The Banner Saga* is set in a Viking legend world populated by Humans and Varl (a race of horned giants), with its artistic style showing harsh, frozen lands and mountains similar to that of Scandinavia.

Game Background

Unlike *Transistor*, *The Banner Saga* does not have a single player character but gives the player a selection of characters between two different roaming parties[17] (Caravans) that are situated at opposite sides of the world map. This gives the player access to a quick exchange of various personalities and background stories, posing the question of how the soundtrack can aid identification of the player with several different main characters. Additionally, the player takes a role in the overall outcome of each caravan's fate, actively making decisions which permanently impact the characters. The choices taken by the player are important to the wellbeing of the caravans, being the small difference between gaining supplies or renown (which can be sold in the game for supplies or to level up characters), but also being accountable for larger, more important outcomes such as the survival or death of a main character, or gaining additional fighters; this is identified to the player before any gameplay, shown in figure 12.

[17] Parties: A group of characters used by the player in game, these members can be changed in number throughout the game.

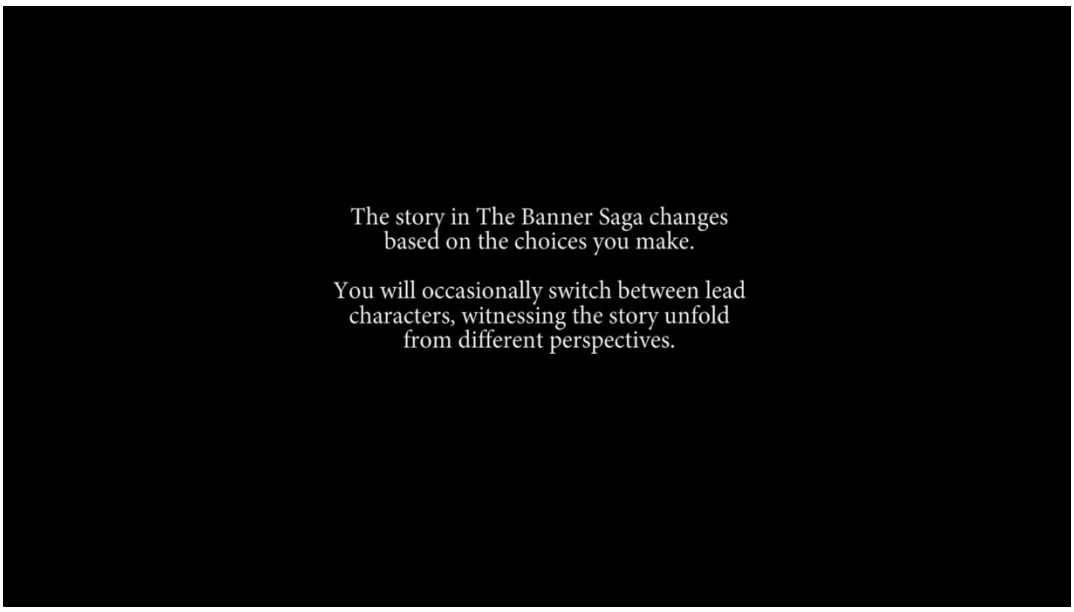


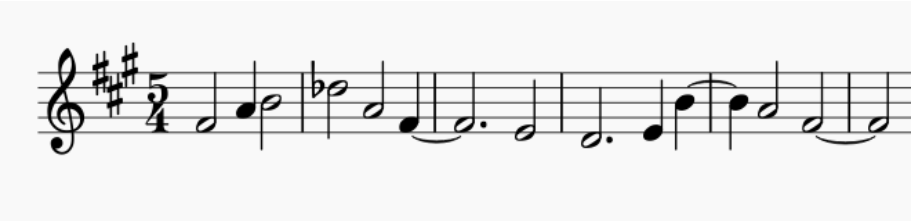
FIGURE 12: STORY CHANGES BASED ON YOUR DECISIONS, UNLIKE *TRANSISTOR* WHICH IS A FIXED NARRATIVE. SCREEN CAPTURE BY THE AUTHOR.

The game-play and its audio can be broken down into three parts, travelling, narrative choices, and fight sequences. As an RPG, the player has a lack of physical control of the character's movements when travelling through the world. Instead, the player commands the narrative lines of two different clans, one led by Varl and the other by humans. Only in battle does the player physically move their team of characters, using a turn based strategy which allows for a certain number of movements per character. However, the player chooses the mapping of conversations through narrative selection, deciding on certain actions along the road; such as deciding whether to rush in to fights, persuading certain enemies to not fight, and resolving domestic problems within the caravans.

Musical Background

The Banner Saga opens with its main theme '*We will not be forgotten'* in the horns, transcribed in example 4, acting as the main melody of the game which is developed and augmented as the story progresses and characters are established, being moved between different instruments, keys, and supported by a variation of rhythms and instruments. Any musical development, however, always makes reference to this overarching melody that symbolises the

story's origin, similar to that of Korb's use of the *Old Friends* theme in *Transistor*. The theme sets up the main instrumentation of the soundtrack, a cold solitary brass sound, which sets the tone of the game for the player.



EXAMPLE 4: OPENING THEME *WE WILL NOT BE FORGOTTEN.*[18] TRANSCRIPTION BY THE AUTHOR.

Travelling

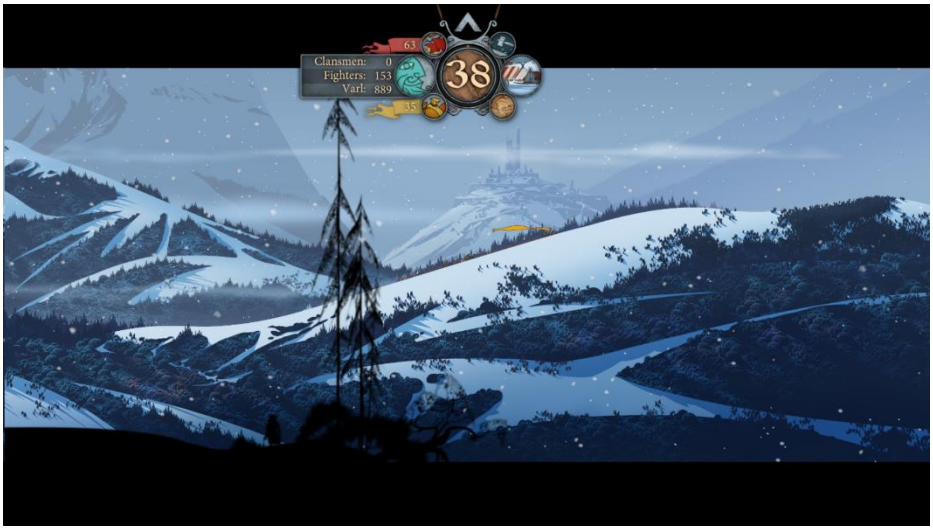


FIGURE 13: CARAVAN AUTOMATICALLY MOVING ACROSS THE SCREEN. SCREEN CAPTURE BY AUTHOR.

When travelling through the game world, the player does not have direct control of the caravan's movements, as they have set pre-destinations; the only control a player has is setting up camp and the choice of which direction to go on the map (although even this is rare). The caravans move automatically in a linear direction and any non-player related cut-scenes or fights are triggered by game, not the player; an example of what the player sees during the caravan movement phase of the game can be seen in figure 13. The soundtrack therefore appears to be interacting

[18] The full track of *We Will Not Be Forgotten* can be found here: https://www.youtube.com/watch?v=FHlXm2096_E (Człowiek Drzewo, 2014)

mostly with game and its visuals, rather than the player, when travelling. This makes it appear that most of the musical material is cue-based depending on the area, turning back to the original theme, rather than a through-composition which would perhaps give additional continuity to the game. However, Wintory explains that for even though there are 29 tracks for the game, there are almost 200 cues taken from those tracks to trigger when changing visuals in the game (Kuchera, 2014). An easier opportunity to create flow and an interesting, free flowing, soundtrack has been created due to Wintory's use of cues as it can identify with subtle changes within the game, such as when the area changes from the wilderness to a godstone (see figure 14), village or city.

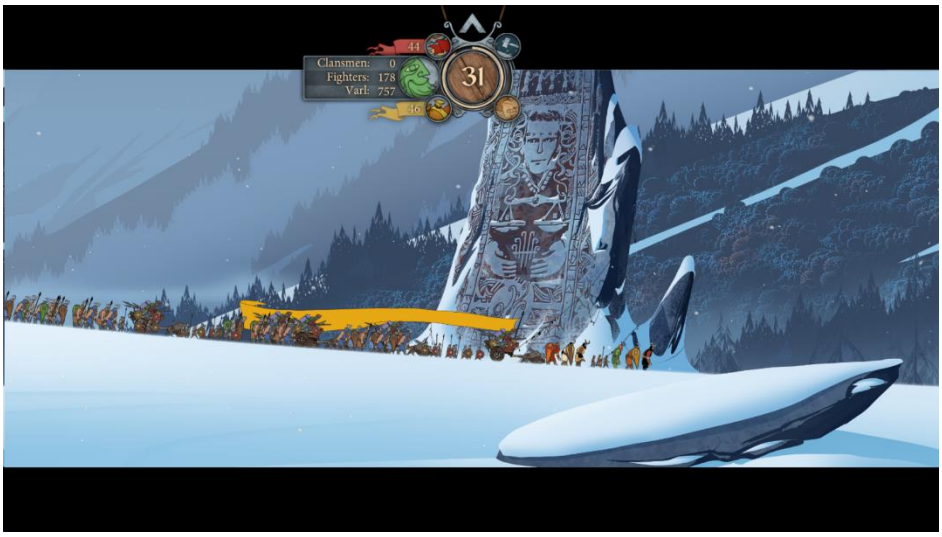


FIGURE 14: GODSTONE. SCREEN CAPTURE BY THE AUTHOR.

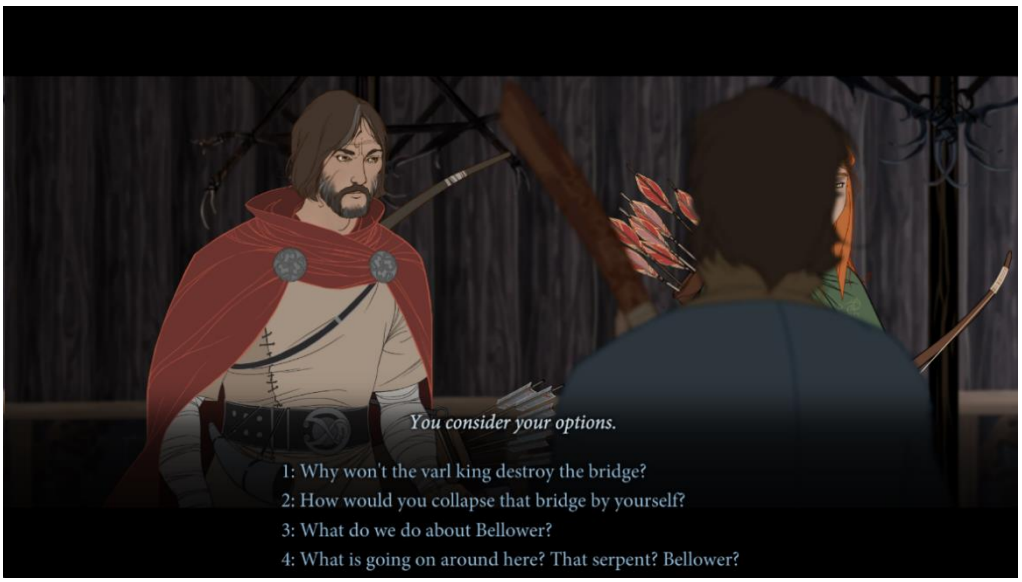
However, with the exception of the player stopping for camp, hard cuts between cues can still be dependent on whether joining music begins over original material, or is joining solely over sound design. As an example, flow is lost when the Caravan reaches a godstone, which causes the soundtrack to change its cue between the two areas. This change lacks any disguise, and although the change of music represents a change in the visuals, it breaks any continuity for the game and the player. Later in the game, when the player leaves the godstone area, a new cue is introduced, however this fades in solely over the sound design of the area and caravan, not having to compete with other music. Due to this fade in, the transition is not noticed straight away and appears blended as part of the world's aesthetics.

Due to the game having little player movement, especially whilst in the caravan area, it becomes more important for the soundtrack to identify the landscape and harsh Nordic wasteland in which the story is set, as the environment in

which the sun has stopped is a large part of the story. As an exceptionally stylistic game, audio representation of the landscape is imperative and aids the engagement of a player in the visual world, even without being especially interactive. Wintory uses a wind orchestra, having already started off writing vaguely for orchestra but found that brass took the centre stage; 'Something about horn solos felt simultaneously regal and noble, but also lonesome and vulnerable. The game needed to have both. A warrior's saddest days' (VanOrd, 2014). The game appears to focus on the mood of the environment and narrative, rather than individual character involvement as the player would be overloaded with different themes and ways of engaging with characters, and this would most likely reduce flow within the soundtrack.

The use of Narrative

Throughout the game, the player is given several choices in relation to their actions, this can either be a decision about how to approach a fight situation, deciding what answer to give another character, whether to scavenge supplies or continue on travelling; examples of this can be seen in figure 15. *The Banner Saga* only applies a small amount of vocality to the game in order to emphasise larger story points that are not governed by player choices, rather than adding a voice to every narrative line given to the player. This reduces the loss of immersion from possible non-realistic dialogue, or characters repeating what has already occurred in the player's head and therefore, because of its rarity, it becomes an exciting feature of the game for the player and explains subconsciously that this is a large and important fragment of the story.



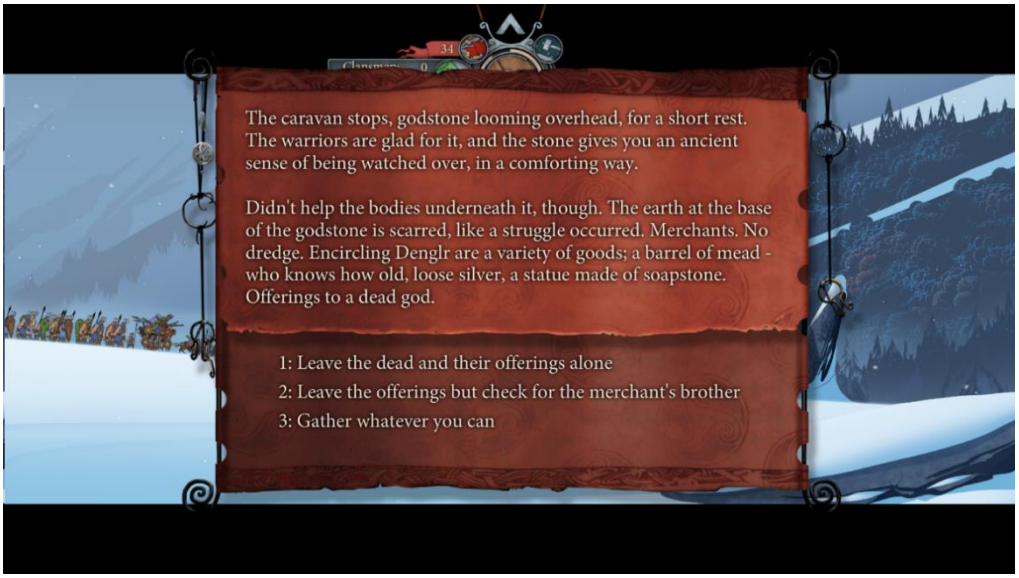


FIGURE 15: THE TWO IMAGES SHOW DIFFERENT OPTIONS OF ACTIONS AND SPEECH GIVEN TO THE PLAYER. SCREEN CAPTURES BY THE AUTHOR.

The use of text then allows the player to have their own vocal impressions on the characters. This permits for a greater engagement through a semi-personality partly set up by the script and partly through the player's interactions, giving more of a sense of ownership or familiarity with the characters.

Sung vocals, however can still be heard in parts of the game, mostly during either the camp areas or at godstones, to symbolise weary folk songs on a long march, a remembrance to the gods that are now dead, and at the end of the game to establish the conclusion of the story. This sparing use of vocals in the music helps to identify the bleak and cold march that the characters must endure in the game, walking from village to village whilst being attacked by the Dredge (antagonist) and other humans. If Wintory was to put more vocals over the wind orchestra, it would take away from the isolation, as VanOrd (2014) admits 'A vocal melody adds some warmth to the track, but when it's over, I feel lost.'

Fight Sequence

The fight sequences see the player situated in a turn-based screen in which they may move their characters by square destination, seen in figure 16. The player and AI[19] take it in turns to move specific characters, attacking enemies that are in range and damaging either their armour or health; the player may take as long as they wish to decide the best action possible. This makes it tricky to form interesting musical accompaniment which can loop without

[19] Artificial Intelligence: Usually refers to the actions of Non- Player Characters.

the player being aware of repetition, as its unpredictable how much time they will spend in the fight. Alongside this problem is knowing how to keep the player in concentration whilst providing effective musical feedback, keeping this physical engagement with the tactical choices they are choosing.

FIGURE 16: AN EXAMPLE OF THE TURN-BASED FIGHTING STYLE THE PLAYER WILL WITNESS THROUGHOUT THE GAME. SCREEN CAPTURE BY THE AUTHOR.

The fight sequences work a lot more with player interactivity and synchronicity in the soundtrack, interacting with the player's actions and their consequences through turning on and off different stems of audio. Different musical cues are introduced into the fight process when the player's characters or the antagonists have the upper hand in the battle. Usually triggered after an attack, or a kill, by either side of the fight, certain instrumental lines, such as the strings, are introduced over the original material to give feedback on the player's situation, whether they are in danger or are winning the fight. The type of material that is cued changes depending on where the player is in the story, as Wintory explains that he didn't write battle music but wrote music that identifies where the battle takes place and puts the music in the context of the overall story and emotional arc. (Kuchera, 2014). Synchresis occurs with one of the characters attacking an antagonist and almost as soon as any damage has been added to a character's stats the music changes.[20] This puts the player into a level of engagement with the fight as the cues give a sense of continuity,

[20] https://www.youtube.com/watch?v=6UNkMJLb2Z8 (Watch from 00:17:52 to 00:18:45) at 00:18:37 when the PC successfully hits the antagonist, a solo string is triggered, giving energy to the fight. (RabidRetrospectGames, 2014b)

without losing flow as the new material is already a part of the track but has been turned off, similar to the technique of Turn() in *Transistor*. These cues also add to a physical and emotional involvement in the fight, either feeling excited that the player is on their way to winning the battle, or worry that they could possibly lose out on in game currency like supplies and renown (which are always in short supply) by losing the battle.[21] However, these musical cues do not happen every time a character attacks, or is attacked, and does not happen in every battle, being rather infrequent in the game. This randomisation of material protects from frequent hard cuts in music material through constant changes, but involves a rare synchronisation which may stop the player from losing immersion through a lack of musical engagement.

Although *Transistor* and *The Banner Saga* are both RPGs, the way in which the compositions work in player engagement differ when applying flow and creating immersion in their soundtracks. However, from their obvious differences come small similarities which actually bring the creation of flow and player involvement. Both use multi-channel music which cues in and out different material which can be seen as a strong way of synchronising audio to the player's technical actions (even though the *The Banner Saga* uses fewer triggers in response to player action). Although vocality is treated very differently between the two games, it's used sparingly in both *Transistor* and *The Banner Saga* in order for it to cause higher emotional value when placed in the games, bringing a small amount of comfort in two very harsh environments. *Transistor*, however, does work with transitioning between music better, using fade outs more and not introducing musical material over one that has already established itself. However, its areas are not loaded in as obviously as *The Banner Saga*, and therefore it is easier to have a sense of continuity in *Transistor* due to the visual flow.

[21] https://www.youtube.com/watch?v=6B1fjBK_gXo (Watch from 00:10:15 – 00:10:30). At 00:10:21 when the player gains the upper hand against the enemy low muted brass are triggered. (RabidRetrospectGames, 2014a)

Chapter 5: Applying models of flow and immersion in a creative context

As part of the portfolio, an (approx.) 8 minute composition was created which applies parts of the dissertation, specifically the model, to its structure[22]. Gameplay footage of *Ori and the Blind Forest* (Cryaotic, 2015) has been used as a substitute for access to an original game in progress; the result demonstrates how the dissertation can inform a compositional approach suitable to the game world. *Ori and the Blind Forest* (both original, 2015, and definitive edition, 2016) is a single player platform adventure game that combines a nostalgia for classic platform games, such as *Super Metroid* (Nintendo, 1994) and *The Legend of Zelda: A Link to the Past* (Nintendo, 1991), but with light RPG mechanics and stronger storytelling; influenced by Studio Ghibli and animated 1990s films (Moon Studio, 2014). *Ori and the Blind Forest (Ori)* was chosen for the composition as it fits well within adventure RPG genre that has been accessed in the dissertation, including a strong narrative and the background story. As a compositional tool its genre falls between both case studies, *The Banner Saga* as a side scrolling area based composed game, and the through composed action RPG *Transistor*. The visuals between each game are aesthetically similar, described by their developers and reviewers;

- *Ori and the Blind Forest*: 'We tried to make every single screen in Ori look like a painting come to life while making sure that the controls are still pixel-perfect' (Moon Studio, 2014)
- *The Banner Saga*: '[H]and- painted landscapes' (Stoic, 2013)
- *Transistor*: '[T]he city of Cloudbank is stunning, a lusciously detailed, hand-drawn cyberpunk future built atop the memory of a red-gold art deco past.' (Fenlon, 2014).

All three are considered artistic, hand drawn, or like a painting come to life, making *Ori* fitting in its representation of the research developed throughout the dissertation. The player controls a small avatar named Ori.

The gameplay video of *Ori* consists of footage from close to the start of the game, after the beginning cut scene and approx. 30 minutes of gameplay (depending on the skill of the player), and can be seen as a part of the prologue as it

[22] N.B. The composition can either be viewed on the memory stick (may be higher quality) or DVD given, depending on viewer preference.

sets up the character background which drives the story and gameplay. The video is a mixture of what the player would typically witness throughout the game, showcasing cut-scenes (from 00:00:20 - 00:03:20[23]), game-play (00:03:20 to the end) which includes fights (i.e. 00:05:04), movement and exploration, gathering experience and gaining new skills (i.e. 00:05:10). Although sound design does play a large part of feedback for a player, and this is not being disputed, the aim of the composition is to create a sound world which, by using the model in the dissertation (p.14) and each of its parameters, creates a sense of flow and immersion for a player by enhancing environment and gameplay.

Interactivity

In order to enhance any interaction between audio, visuals, and player action, the composition uses Whalen's (2004) description of Mickey mousing[24];

> Mickey mousing, or "mickeymousing," occurs in both animated and live-action cinema when the music provides a synchronized, aural imitation of what is happening on the screen (Neumeyer and Buhler, 2001). The goal in simple mickey mousing certainly seems to be more physically or kinaesthetically oriented, but in that it represents a character's relation to its fictive universe, mickey mousing roots the cartoon character in a whimsical world whose space is responsive only to the constraints of the character.

This enhancement between audio and visuals is related by Whalen to film and television composition, as he explains that the response is only to the constraints of the character, rather than video games which includes the interactivity of the player in these scenes. For the composition, this mickey mousing goes further than only the representative constraints of the character by expanding the response of the player-character, contributing to any anthropomorphism gained from interactivity and a sense of movement, as discussed by Collins 2011. Mickey mousing was synchronised to the Owl antagonist in order to signify the size and importance of this character in the game story – a semiotic relationship similar to that described by Tagg. For example, the timpani is synchronised at 00:01:38 and

[23] All time stamps given like this are a reference to the supporting composition.
[24] These principles behind the composition are for a pre-existing play-through rather than a live music, game, player relationship. This is a representation of what would occur in the 'real-world', where the game engine reacts to player movement, triggering a score interaction with the game world.

00:01:51 with the downward movement of the owl's wings, as it's a huge gesture that, if ignored, would not give the correct sense of its magnitude. This level of interactivity is also best seen in the game-play as it involves an interaction with the player character. It's not necessarily intense synchronicity, but it mirrors the energy and randomness of the sprite's movement through an active vibraphone and harp at 00:07:09 – 00:07:20. Although not a direct interactive with the player, it does somewhat represent the character relations with the environment, through the PC's naturally bouncy and animated movement in the whole game.

Another type of interactivity reacts to the player directly rather than their player character, following when the player opens the map screen. *Endless Legend* (Amplitude Studios, 2014) adapts its musical material by dropping out certain lines when the player enters the tactics menu. The technique is subtle enough that it can be completely missed by the player, but creates a calmer atmosphere in which they can organise their thoughts and game tactics. This process also occurs in *Dust: An Elysian Tail* (Humble Hearts, 2012), a side scrolling platform RPG with similar aesthetics, however the music continues as before but drops in dynamics. A combination of both these compositional techniques were included when the player uses the map screen, material is reduced in its dynamics whilst leaving the solo instrument at its original volume. This would give the player a break from on screen action as they attempt to navigate the map, identifying that the game world has paused and there are no repercussions to the character by the player entering the map.

Believability

Creating a soundtrack which interacts with a player also needs to fit the visuals of the game world, described as a moving painting by the developers (Moon Studio, 2014). Therefore, the timbre of the composition was originally based off the description of *Ori* and on the relative descriptions of both the case studies and *Dust: An Elysian Tail (Dust).* The composition is made up of orchestral instruments due to its traditional painting-style visual aesthetics;

- Strings: Violin solo/I/II, Viola solo/I, Cello, Harp
- Woodwind: Flute, Clarinet I/II
- Brass: French Horn
- Tuned Percussion: Timpani, Vibraphone bowed/hit

- Other Percussion: Cymbals

This choice of instruments helps to set up the sound world for both the cut-scene and game-play, using traditional instrumentation to inhabit the wild, unpredictable, yet warm environment. This took influence from the case studies' use of semiotics to represent story environment, such as *Transistor's* use of guitars, synths and a popular music influence to represent the city culture, and *The Banner Saga's* use of a wind orchestra to identify with a cold and harsh landscape.

To aid the completion of this sound world, any transitions made between the visuals and composition were treated with preference to the *Transistor* and its use of fades to move between area music. The composition is through composed to reduce the sense of completely separate areas as any changes to musical material are faded and reduced in dynamics before being taken over by different instrumentation. A through composition was important to the structure of the overall game, as every area is connected for the player to go wherever they please, as can be seen in figure 17; the different colours represent separate areas which the player has free access from the beginning of the game (the player is only limited by a lack of skills that allow them to progress in certain areas). In connecting an open composition with an open environment for the player, it is then more likely for the audio to be coherent with the game world and therefore a suspension of disbelief can be achieved.

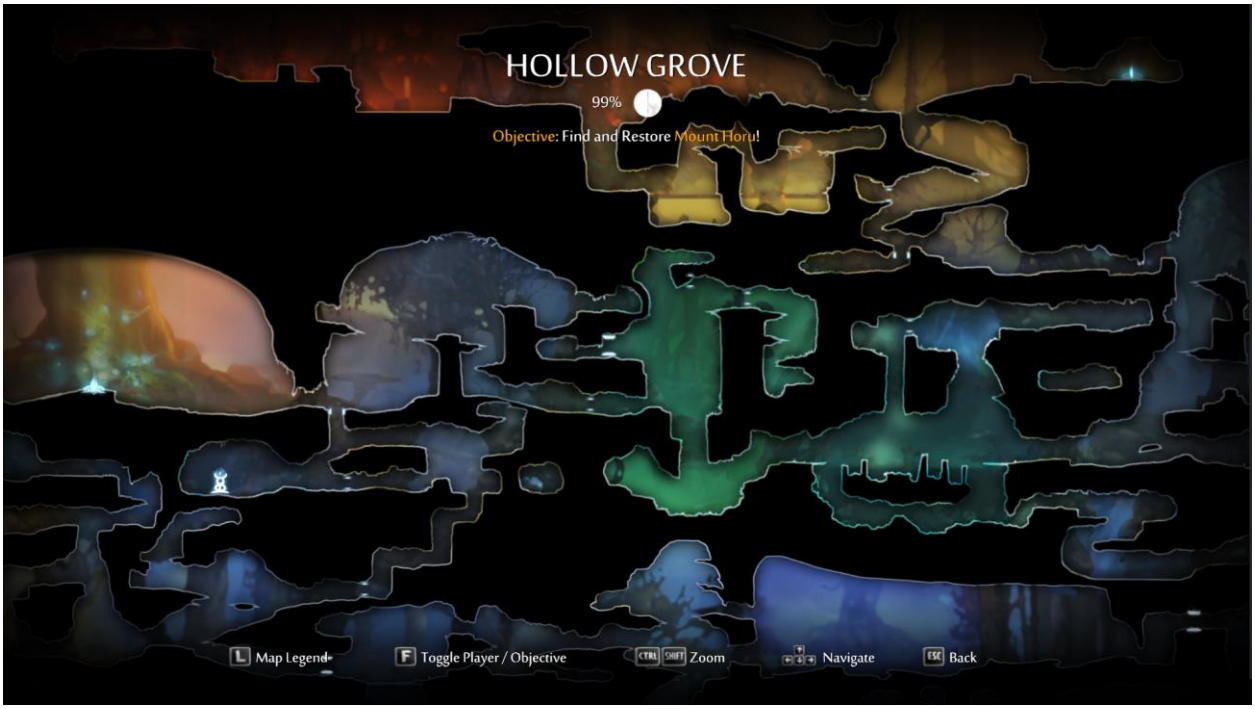


FIGURE 17: MAP. SCREEN CAPTURE BY THE AUTHOR

This left its own issues when the music needed to change its material, as fading out one style of material for another can still be disruptive to a player's sense of musical flow, even without hard cuts. To get around this problem, the composition uses an element of previous material and carries it through the changes in aspects such as the prominent instrumentation. For example, the woodwind takes the lead material at 00:07:04 from the strings which carried the composition from 00:06:12, its transition is disguised through the clarinet mimicking the viola solo over the change to woodwind.

Feedback

Feedback, especially in relation to game-play, relies heavily on sound design to help the player identify with their actions, such as fighting, taking damage, picking up items, etc. In order to create a composition which generates feedback without fully replacing the role of sound design (the composition assumes sound design will be placed over the end product), subtle dissonances and adaptations of themes were placed in synchronisation with the visuals and kinesonic synchresis with the player action to achieve both successful feedback and flow.

The issue that came across in the composition was the interaction the player would have with an enemy, or equally the destruction of an object, and how feedback can be given to identify this through triggers and signs in the musical language, without the aid of sound design whilst being subtle enough to not break flow. This was realised through adding a harsh dissonance, triggered when the player is confronted with an enemy (00:03:54- 00:03:59 and 00:05:03 – 00:05:08), in the Violin solo where (at 00:03:54 - 00:03:59) an A and A# are held against each other, and then later (00:05:03 – 00:05:08) a G is held against an A#, eventually moving down to an A to form a longer but less static dissonance. On an occasion where there is no enemy but the player character destroys an object, dissonance is used but for only brief moments, i.e. 00:05:51 & 00:05:58; the dissonance is only fleeting in comparison to confronting an enemy. At 00:05:51 when the player breaks a wall, a C# and D are sounded on the vibraphone, but only for a second to signify, and mickey mouse, the action. Later, at 00:05:58, a G and A are sounded on the vibraphone but are accompanied lightly by the Bass Clarinet adding a dissonant G then B. The reason for adding the woodwind in the second

time but not the first allows for randomisation in the dissonance which stops the same sounds being played throughout the game, which could be tedious for a player. This also allows for the dissonant vibraphone to blend in with the sound world during this part of the game where clarinets are in control of the material, therefore not calling direct attention to the vibraphone.

Engagement

Engagement in the game world is introduced in the composition through familiarity and the introduction of new material to allow for bodily involvement and engagement of the player, without breaking flow.

Familiarity is set up through the augmentation of themes between cut scene and gameplay, specifically between the semiquaver and chords at 00:00:56 in the piano that are recreated in the 00:05:15 with the semiquavers in the vibraphone and the chords split up between the woodwind parts of clarinet I, II and flute. This allows for the player to understand they will soon receive a new skill. However, this material is representative of finding this first skill tree (figure 18) and not related to the interaction with the tree, in order to change the musical material within the same sound world but also to form embodied cognition around audio they have already experienced in the game world. The musical material heard from 00:05:27 – 00:05:35 will be used in future interactions with the tree (there are several within the game world) to symbolise to the player that they will be gaining a new skill. This will replace any original musical material that is playing at the time, as soon as the player has pressed a button to interact with the tree.

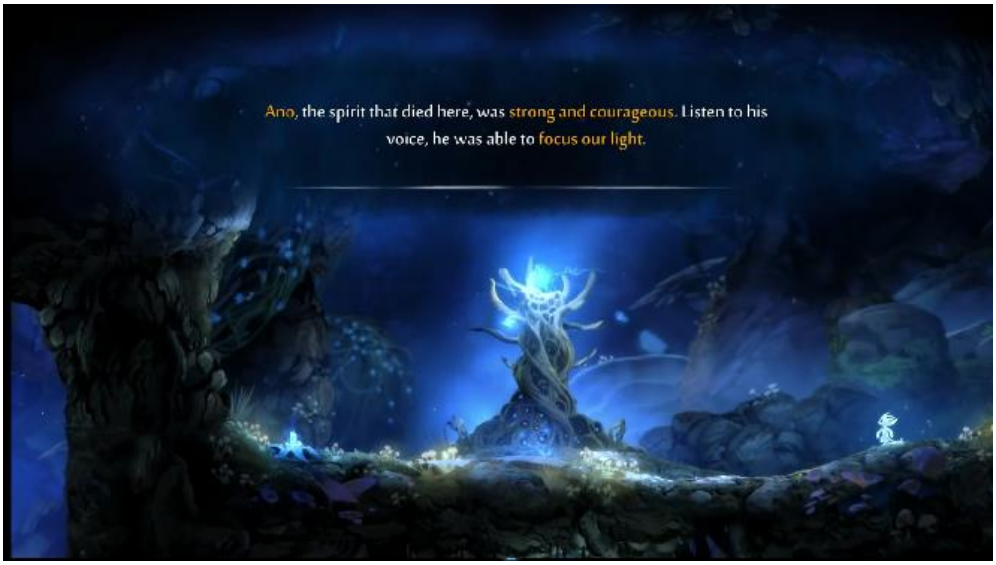


FIGURE 18: SKILL TREE. SCREEN CAPTURE BY THE AUTHOR

FIGURE 19: CHARGE FLAME SKILL. SCREEN CAPTURE BY THE AUTHOR

The skill that the player gains in the video allows them to charge a ball of light in order to break through certain barriers; an image of the player gaining 'Charge Flame' can be seen in figure 19. After the skill theme has played, the area music needs to be able to showcase this new talent to make it appear exciting that the player can now progress to areas that were originally off limit. In order to signify this new charge ability, and to remind the player of its use, the woodwind between 00:05:42 and 00:07:20 swell in dynamics through to a climax and then drop back, with a repeat, to represent a charge and release similar to the new skill. The idea would be that every time the player finds and gains a new skill, the music would change to best represent the player levelling up.

Emotional Involvement

To form an emotional involvement with the game world and its characters, the composition took influence from *Dust: an Elysian Tail* which is similar in its visual aesthetics; 'Immerse yourself in a gorgeous hand-painted world on a search for your true identity' (Humble Hearts, 2002). Figure 20 shows the likeness of the two games in style.

FIGURE 20: ABOVE: DUST AN ELYSIAN TAIL. BELOW: *ORI AND THE BLIND FOREST*. SCREEN CAPTURES BY THE AUTHOR

Due to its similar description and gameplay style, it is worth taking influence from *Dust* in its use of orchestral instrumentation and area based audio to invoke player emotions in the background of gameplay. Table 8 identifies tracks which gave influence on creating emotional involvement during game-play, which can be especially difficult when the environment does not change.

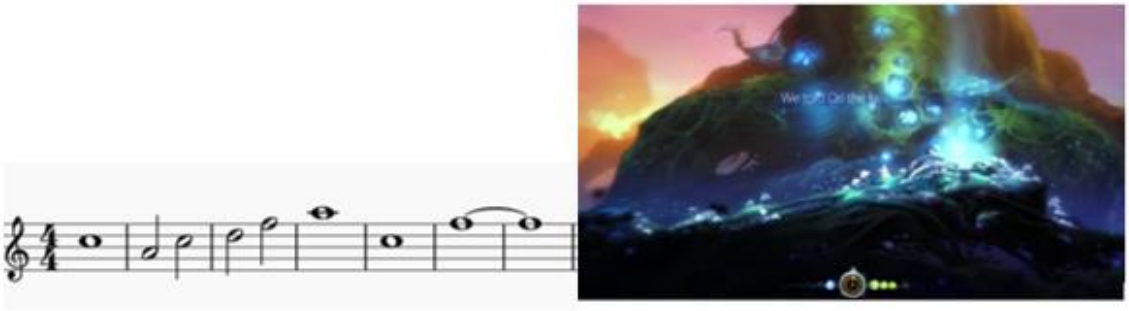
Track Name	Type of Soundtrack	YouTube Link	Timestamp to watch for *Dust*	Influence on Composition. Timestamp
Blackmoor Mountains	Atmospheric	https://www.youtube.com/watch?v=DFQGewcjngo	00:01:03	00:06:30 – 00:07:20
Cirromon Caverns	Atmospheric	https://www.youtube.com/watch?v=MBSaz5sNCxU&list=PLorRj-mej6CBkw9lSPm3vQwu6V4yrGm_tm&index=10	00:03:28	00:06:00 – 00:06:30
Abadis Forest	Driving movement and attack	https://www.youtube.com/watch?v=NjiIDrVmQyk&list=PLorRj-mej6CBkw9lSPm3vQwu6V4yrGm_tm&index=7	00:01:33	00:04:21 – 00:04:50

TABLE 8: INFLUENCES OF EMOTIONAL INVOLVEMENT FROM *DUST*. TABLE BY THE AUTHOR.

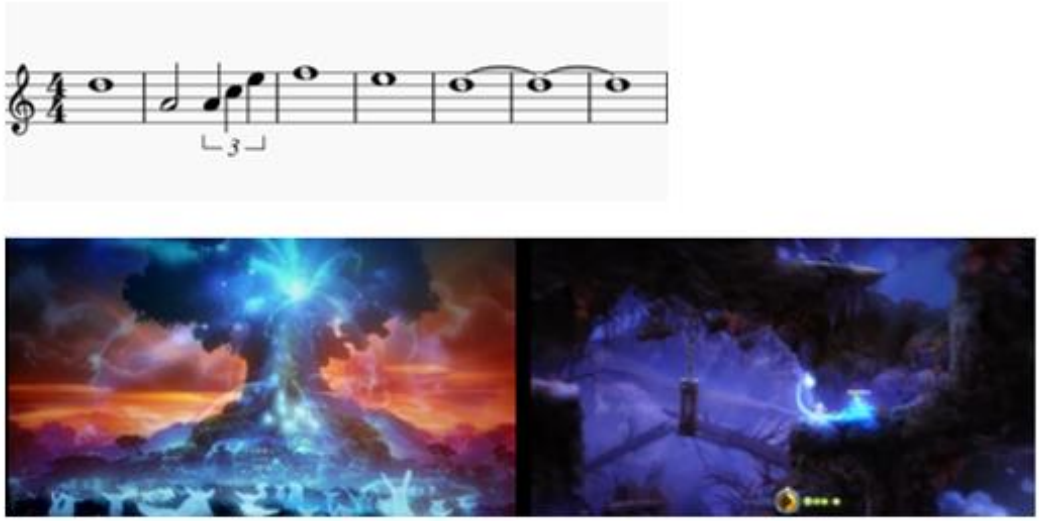
To create a sense of emotional continuity, especially in the narrative, the music needs to, as Brown and Cairns admit, perceive and interpret visual stimulus, a key to invoking emotional involvement. The cut-scene section of the game (00:00:20 - 00:03:20) is used in this set up of emotional involvement between the game world, narrative, and the player; at a time where the soundtrack can express these emotions without being interrupted by player interaction. The composition uses a full string sound with solo violin and viola to introduce peace and prosperity in what can be assumed as the player character's original home at 00:00:56, giving comfort and a sense of calm at this point. This remains until the introduction of the antagonist at 00:20:00 where the music becomes dissonant and darker in timbre, foreshadowed at 00:00:17, with the rhythm becoming sporadic and disorientated to contrast and extinguish any feeling of safety the player may have originally felt. In the aftermath of the cut scene, to let the player digest what occurred, all instruments apart from the piano, which returns with an augmented theme at 00:02:09, to give a brief moment of thought and relief.

Like *Undertale*, themes were put in place to involve the player throughout the game, connecting the cut-scene and game-play together, as small reminders of the overall narrative of the game and becoming links between different

areas of the game; as can be seen in example 5 and 6.



EXAMPLE 5: OPENING CLARINET I (00:00:15). SCREEN CAPTURE BY THE AUTHOR.



EXAMPLE 6: VIOLA SOLO (00:01:00 & 00:06:49). SCREEN CAPTURE BY THE AUTHOR.

These examples show that, even between two very different environments and times in the game, there is an overarching story and character development. This is easy to lose in an open ended game-play environment, and therefore must be brought back between areas and musical material in order to remind the player of the emotional connections they do have with their player character.[25]

[25] N.B. the fade out of music at the end of the composition does not reflect what would have occurred if the composition continued.

Conclusion

Despite the increasingly large body of work in flow and immersion, this thesis identifies the importance of both these ideas especially when forming a player's physical and emotional involvement with a game world. Looking back to the model, its goal was to inform composition through the application of its parameters to audio, subsequently forming player immersion and flow. A variety of scholarly and unscholarly approaches and research were able to identify specific parameters which would form the model and identify how a composition may create both physical and emotional involvement between a player and a game, when applied to typical RPG, action-adventure, style games. It became apparent that certain parameters are flexible between both tiers of the model, giving the idea that instead of being separate parameters, they all interact and aid the creation of each other. As an example, synchronicity was placed mostly within believability however, this aspect was also discussed in interactivity, feedback, and also linked to empathy and emotional involvement in the world. In order for the model to inform composition for nonlinear media such as video games, it needs to become adaptive to allow for techniques and parameters to link fluently between the other, to create flow in the model itself. However, as a starting point to identifying the most important parameters that should be involved with video game composition, the model is successful in its guidance.

Applying the parameters and model to the supporting composition, it became clear that the composition was able to create physical and emotional involvement, through successful interactivity with the parameters during the compositional process. However, because of the lack of sound design, it can be noted that certain parameters such as feedback were difficult to create, as foley representation would been more effective for moments such as the player character losing health. From the overall research of the dissertation, it could also be seen that sound design is more effective when dealing with the first tier, whilst the second tier can concentrate more on the musical formation of player engagement and emotional involvement with the game world. However, the supporting composition does show that all parameters can be met through only a soundtrack, and can be especially effective in representing both player action and subsequent feedback, in order to engage and engross them in the game world. Feedback did appear to be the only parameter that needed sound design through the composition, only falling short on action based

representations. The composition took examples of practise from the existing case studies; *Transistor* and *The Banner Saga.* Its success in forming a cohesive sound world in the game identifies the case studies' usefulness when applying the model's parameters to a practical and creative concept. The case studies both identify with the model and its parameters, whilst using unique ways in manipulating a soundtrack to succeed in forming flow and immersion.

The research from the paper identifies that immersion is only likely when flow is apparent. Flow in a composition does not only refer to a coherent audio background, but a representation of game-play mechanics and feedback. Player engagement through responsive and appropriate audio is key to a sense of flow, as a lack of audio-haptic relationships can reduce a sense of flow for a player, even if it has been achieved in the soundtrack. If a player is to sense a flow between audio and game-play, physical involvement can be assumed and the likelihood of a player wanting to become emotionally involved in the game world is greater. With these two player parameters in place, it's possible that the player is immersed and likely to want to choose the video game again in the future, and remember the game outside of itself.

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