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The Sound of Playing:
A Study into the Music and Culture of Chiptunes

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Abstract

The sound made by early videogame consoles has become synonymous with representing the sound of playing all electronic games. A musical movement called, Chiptunes, is embracing these sounds and reinterpreting them for self-expression. In recent years there has been resurgence in the popularity of this music, through the accessibility of creative software and the proliferation of online communities. However, the literature surrounding this topic is predominantly journalistic and therefore lacks depth and academic credibility. In response to this the following research project undertakes a thorough investigation into modern Chiptune musicians and the cultural and artistic significance of their music. It achieves this by including surveys and interviews with a number of active Chiptune musicians, as well as incorporating the author's own experience in creating this music. The results of this study reveal a detailed understanding of the effect of technology on composition, the importance of human-machine interfaces and the development of participatory culture.

Keywords

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Certification

I hereby certify this work is original and has not been previously submitted in whole or part by me or any other person for any qualification or award in any university. I further certify that to the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the thesis itself to the source of such material.

Signed …………………………………

Date.…………………………………

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Introduction

Throughout history, music composers have been influenced by their artistic surroundings, often incorporating elements of other influential art forms into their own work. Just as it is commonplace for composers to be influenced by books, poetry, theatre, art and films, so too many Generation X and Y artists are influenced by videogames because these represent some of the most prominent art forms of their childhood (Curran, 2007*)*. In recent years this has included people creating their own hardware and software applications to compose music based on the use of video game technology.

Early computers and video game consoles feature a specific timbre and quality of sound. These sounds signify a connection to video games, even though it has been decades since they were first heard, the 'beeps and bloops' of these early games may seem harsh and annoying to most listeners. However, for the generation of people that grew up with the sounds, they hold a semiotic value of childhood and happiness (Ramocki & Strawhand, 2006). This form of electronic video game music is referred to as 'Chiptunes'.

This field is predominantly left undiscussed within academic circles, and most literature regarding this music is journalistic in nature and relatively shallow in content. The author, as a practitioner of this music feels it is important that the significance of this musical and cultural movement be discussed in relation to its artistic value and not be hindered by the elements of publicity hype or superficial gimmickry that is present within the journalistic writing.

This paper details the recent resurgence of Chiptunes, providing an in depth discussion regarding the creators of this music and its artistic and cultural value. Firstly a historical background is provided to explain context and definitions of the music. This is followed by a review of the surrounding literature. The research questions are then presented to address the areas lacking in the literature. A methodology utilising the author's position as a participant within this culture is then presented to address these questions. This is followed by an explanation of the research instruments, which include questionnaires and interviews with Chiptune musicians. Finally the results are presented and discussed. The study encompasses a balanced view of the music and culture of Chiptunes to create understanding for people being newly introduced to the music, as well as provide interesting points of discussion within the community.

Historical Background

Chiptunes could be overlooked as just one of hundreds of emerging electronic music sub-genres. Monroe (1999) discusses how the velocity in technological advancements is mirrored in the creation of electronic music sub-genres. According to Monroe (1999) this applies to both retroactive and modern sub-genres because the creation of a sub-genre based on new technology will often cause a retraction or 'mutation' back to the genre's origins.

Chiptunes seem to hold no singular genre as its predecessor. The only things consistent within Chiptunes are the tools, which are appropriated from videogame technology. All other musical elements such as rhythm, melody and even timbre, which are often defining elements of a musical genre, vary drastically between artists. As Swedish Chiptune artist Random (2007) wrote,

> Chiptune isn't a genre like rock for instance, where the characteristic lines of the genre is drawn from the arrangement and construction of the music, as well as the instruments. No, "chip" is the instrument itself, and with it (or should I say "them") you can make music from all kind of genres, like rock, pop, dnb [drum and bass], house or dub (para. 2).

Therefore Chiptunes may not necessarily be regarded as an electronic music sub-genre, rather, a stand-alone genre, which, unlike the sub-genres that mutate regularly, will take a new path with an unknown and intriguing future. Subsequently, the culture associated with Chiptunes may hold distinct characteristics that are worth exploring.

The tools used to make Chiptune vary from each musician. In the mid-1980's, all computer systems had simple sound chips and these were generally used for game soundtracks, but often music software was also available or self-programmed. These computer systems such as Atari, Commodore 64 and ZX Spectrum were some of the first systems on which Chiptunes were created. So through the 1980's-90's these systems developed a dedicated following of programmers and musicians, many groups of which are still active.

The modern Chiptune resurgence can be seen occurring from around the turn of the millennium with a few key events leading to its rise since. In the late 90's, development tools became commercially available for writing Nintendo Game Boy cartridges (Wittchow, 2007). With this technology in mind, two programmers Johan

Kotlinski and Oliver Wittchow, individually developed two distinct music sequencer programs for the Nintendo Game Boy. Kotlinski used his programming skills to create a complex Game Boy music program called Little Sound DJ (LSDJ), which he began selling from his website in 2000 until he ran out of cartridges. Now the program is only available for those who purchase it second hand or who burn it onto their own cartridges. Wittchow created a Game Boy program called Nanoloop for an experimental music competition in 1998 and has since been developing the program. Nanoloop has a minimal but intuitive graphical interface and is regularly available for purchase from his website (Wikipedia, 2007). These two programs are the most popular and well known pieces Game Boy music software and soon became a starting point for Chiptunes' acceptance into a wider audience. This was furthered by articles in mainstream press in 2003 and the release by Beck, the mainstream artist, of Game Boy Variations in 2005. This was a CD of Beck's songs remixed by Chiptune artists. 2006 saw the inaugural Blipfest, a 4-day Chiptune only festival, take place in New York. This coincided with the 50th release by 8bit Peoples, the popular Chiptune Internet label that was a compilation album with 50 different Chiptune artists from all around the globe. Most recently, in 2007, a CD was commercially released entitled *8bit Operators* which included Chiptune artists covering Kraftwerk songs. This CD was reviewed and discussed in most mainstream music journals. These events are just some of the contributing factors to the number and diversity of practising Chiptune artists currently around the world.

The Literature

Many music-focussed subcultures are geographically based, having perhaps a single city where the culture originated and flourishes. This supports the general definition of subcultures as being "a group of people that differentiate themselves from others and find identity amongst themselves through the appropriation of space and through styles of visual and aural self-representation" (Thornton, 1997, p. 7). In the case of modern Chiptunes, the space appropriated is not geographic, but virtual. The Internet makes geographic boundaries irrelevant, allowing people to share music and build a subculture primarily existent online.

The influential nature of videogames on Chiptunes is clear and direct. However, the effect of videogames on the international cultural and art community is poorly understood. This is due partly to the fact that "we still cannot take play seriously"

(Zimmermann, 2003, p. 2) and also because of the negative stereotype of videogames being only for adolescent boys and hence having no external cultural relevance (Ibid). This lack of credibility is a factor that has led to a deficiency in academic studies into this field, especially in the area of the cultural significance of videogames on other art forms.

Lysloff (2004) conducted an academic study on Chiptunes, using "an Internet ethnography" (p. 23). This study involved participating in forum discussions and becoming immersed in an Internet culture. His study focuses primarily on the "demo and mod scene" (p. 39). This community, mainly based in Europe, consists of young programmers who compete with one another by getting the most out of specific pieces of computer hardware. This involves the creation of 'demos' in which a programmer shows off graphical and musical programming ability. The musical programming utilised the limited sound chips of the early computers and are therefore Chiptunes.

In relation to this research project, the relevance of Lysloff's work is varied. His study provides a detailed account of the history of Chiptunes. However, it falls short of explaining the modern phenomenon that has opened this music to an audience beyond the 'demo-scene'. Today many musicians and non-programmers create Chiptunes, and there is actually a type of 'generation-gap' developing between the demo-scene and modern Chiptunists (VORC, n.d.). I believe this is due to the recent development of accessible music software for various videogame systems. In particular, as mentioned, this is occurring with the Nintendo Game Boy (Wittchow, 2007). The demo and mod scene in many ways can be seen as the pioneers behind the current Chiptune trend. However, whilst they are still active today, they are very underground and keep to themselves, unlike many other modern Chiptune artists who expand and promote the music to new audiences.

Whilst the Lysloff study provides an overview of Chiptune's origins, the field of modern Chiptunes is still largely left undiscussed in academic literature. However, there is a large body of journalistic articles and online discussions. Interestingly, Lysloff is quoted in an article in established technology magazine, *Wired,* about modern Chiptunes saying that "the relative low-tech angle ... wears thin very quickly. It just all sounds rather flaccid. I might even add that it isn't even very good" (cited in Null, 2005, para. 11). This statement indicates that perhaps Lysloff is unwilling or unable to examine matters beyond quality of sound in order to further explore the larger socio-cultural and artistic impacts of this musical practice.

Support for the cultural significance of this music is provided by a variety of journal articles. One article in particular, written by Malcolm McLaren (2003) for *Wired* magazine, provided Chiptunes with wide exposure and solid support. McLaren is best known for being the manager of 'The Sex Pistols' and general creator of the Punk style. Also in the early 80's, he introduced Hip Hop to a wider audience with his album *Duck Rock*. Due to the commercial success of both Punk and Hip Hop following McLaren's involvement, he is both revered and despised within popular culture. In the *article 8-Bit Punk,* McLaren (2003) predicts Chiptunes as being "the new sound of the underground" (p. 1). In so doing, he not only created media hype about the genre, but also explained its cultural and artistic significance. The key point of this significance, according to McLaren, is that Chiptune artists imbue their work with such passion and obsession that it has a certain integrity which is lacking from the commercial music industry (Burke & McLaren, 2004).

The Chiptune community's response to McLaren's interest and involvement is well documented and demonstrates the discrepancies between what the literature says about the music and how the practice actually occurs. Chiptune artist, gwEm (2004), wrote an open letter to address the discrepancies between McLaren's views and the reality of the community. Some of the opinions include the fact that this music isn't a cheap alternative to making music on computers. In fact, the cheapest way for aspiring artists to make Chiptunes is by downloading free software to use on a Personal Computer (PC). One aspect of Chiptunes that is incorrectly raised by most press (McLaren, 2003; Null, 2005; Loftus, 2003; Culshaw, 2004) is that creating this music involves hacking videogames. For the music program creators, it is a simple matter of downloading free programming applications for these videogame systems. For the users of these programs, they most often buy physical software cartridges from the creators website or use free software on their PC. The final point which gwEm (2004) approaches is the Chiptune community's concern that McLaren seeks to pillage and claim ownership of Chiptunes, as he previously did with Punk. Almost four years on, it can be seen that McLaren has not sold Chiptunes out to the mainstream. However, the point remains that much of the journalistic literature does not directly reflect the artistic practice.

Chiptunes are not created because, as McLaren (2003) mentions, practitioners can't financially afford an alternative, nor is it because artists are trying to make a statement about the music industry. These points are seemingly a stylish fabrication by McLaren to create hype about the music, as Barakowski (cited in Culshaw, 2004) said, "Malcolm

proved that hype was art and that the media is a canvas that demands to be shaped"
(para. 8).

The Research Questions

The ideas presented in the above literature forms several key areas regarding modern
Chiptunes. There is a certain lack of facts and details pertaining to Chiptunes. Whilst
Lysloff has explored some areas, the topic of modern Chiptunes and their artistic
significance remains undiscussed. As shown above, whilst there is enthusiasm and
support for the genre within journalistic media, the details often do not reflect the actual
practice. Therefore this study aims to discover the true attributes that unify Chiptune
musicians and what relevance the music has on the broader artistic community. So the
questions posed by this study are:

- *What are the unifying and conflicting attributes of modern Chiptune musicians?*
- *What elements of cultural and artistic value are present within the Chiptune genre?*

A Research Methodology has been developed (see below) to address these questions
and provide data for discussion of the questions key issues. The questions will then be
approached separately with the first question being discussed within the *Results* section
(p. 10) and the second question providing the basis for the *Discussion* (p. 20). The first
question is a way to gain understanding into the art form whilst the second question
discusses the points of value within the art form.

Research Methodology

At this point it is important for me to explain my own relation to this topic as a rationale
for the research and also provide authority for the opinions and views I express. For the
last two years I have been an active member of several online Chiptune social networks.
This has involved participating in online forum discussions, immersing myself in a wide
variety of Chiptune related media, and creating and performing my own Chiptunes. So
for this research I am employing the ethnographic technique of participant observation
(De Walt & De Walt, 2002).

This type of research involves a certain amount of interaction and field study, but
due to the geographical spread of this subculture and the lack of a sizeable scene within
Australia, the majority of the study took part with online social networking. As with
Lysloff's (2004) *Internet Ethnography*, it is possible to gain a rapport and depth of
insight into the members of this subculture through the established community websites.

Online communities make participation much easier, because anybody can sign up to discussion boards and take part in conversations. This community is already fairly close, however they all welcome newcomers. To build rapport and close relationships, it was important to single out individual members and communicate with them separately and privately, as mentioned in De Walt and De Walt (2002, p. 35).

Community-based websites are designed to allow artists to share music, comments, and discussions, which is an important aspect of the environment because it connects the artists, as well as providing standards as to what the majority like and hence, what direction the genre will go. Two social networking communities I have been involved with are *8bit Collective* and *Micromusic*. These communities vary quite drastically and provide different insight into how the overall culture and music is developed and created by its participants. *Micromusic* is a highly developed and organised hierarchical community, with discussion boards and controlled media sharing. *8bit Collective* is more democratic, having completely open discussion boards and media sharing. Within these communities, I am not one of the most active participants, but because of my consistent minor involvement, I am recognised and feel part of the community.

Being a primarily music based subculture, it was important that I took part in creating, performing, and sharing my own music. This involved the acquisition of the various pieces of equipment, trying to get to know their inner workings, and writing music on them. I try to use as wide a variety of tools as is financially possible. This limits my participation because I still do not have a deep understanding of how some of the music is made. In regards to performance, I have played live solo shows in Brisbane, Australia. Discussions following my performances, with audience members who have never heard of Chiptunes, provide an objective insight into how Chiptunes are perceived by the general public.

The observation can take place within these online communities without seeming obtrusive and without affecting the individual members' behaviour. In this case, observation involves going through many different media sources, listening to the music or community based Podcasts, watching videos of live performances, reading blogs and forum posts, and checking many different community or individual artist based websites. All of these details, when combined, allow me to correlate the similarities and differences, and realise what things are important within the community. This process is very similar to Schenschul et. al's (1999) process of "enculturation" (p. 74). This is the process of socialisation and immersing oneself in the culture of the research subject.

The Research Instruments

The significance of the Chiptunes genre, both culturally and artistically, is best understood through the opinions and practices of the artists themselves. For this study to gain insight into the background and artistic intent of Chiptune musicians, members of the community took part in email based interviews and questionnaires. This information is compared to ideas raised in the aforementioned literature, as well as my own experience in creating and performing Chiptunes. This provides data for an in-depth discussion on Chiptunes in relation to the artists and their practice.

The various artists are selected to participate in the study using judgmental sampling (Fetterman, 1998, p. 33). This involves using my position as a participant observer within the Chiptune community to make a judgement in selecting who is appropriate to my research. This included both prominent long-term members of the community as well as active newcomers (see Appendix A: Details of Participating Artists). The sample is intended to be a relatively small group that includes a wide variety of artists, providing a balanced cross section of the Chiptune community, hence providing the study with an overview of varying aspects of the current Chiptune genre.

The selected participants were given the option to answer either an email questionnaire or participate in an online interview. The same questions were used for both. However, the interview allows for probing and interrogation to gain clarification and greater detail on matters of importance to this study (see Appendix B: Questionnaire). The question design involves all open questions in an attempt to allow the participants to express their views fully and openly (Flick, 2006, p. 149). The questions are aimed to address the research questions by providing details on the Chiptune composer's musical and technical background, their compositional tools and process, their artistic intentions and some specific cultural and community based issues. This provides data useful to address the research questions by discussing the unifying and conflicting attributes of Chiptune composers' as well as raising points of cultural and artistic significance.

The format of interviews and questionnaires is comfortable and unthreatening for the participants as they regularly communicate online. Because I already participate in the community, my questioning allows the participants to feel they are communicating with a fellow Chiptune colleague. This enables the development of a rapport that delivers a higher level of personal and honest detail from the participants (Creswell, 2003, p. 181).
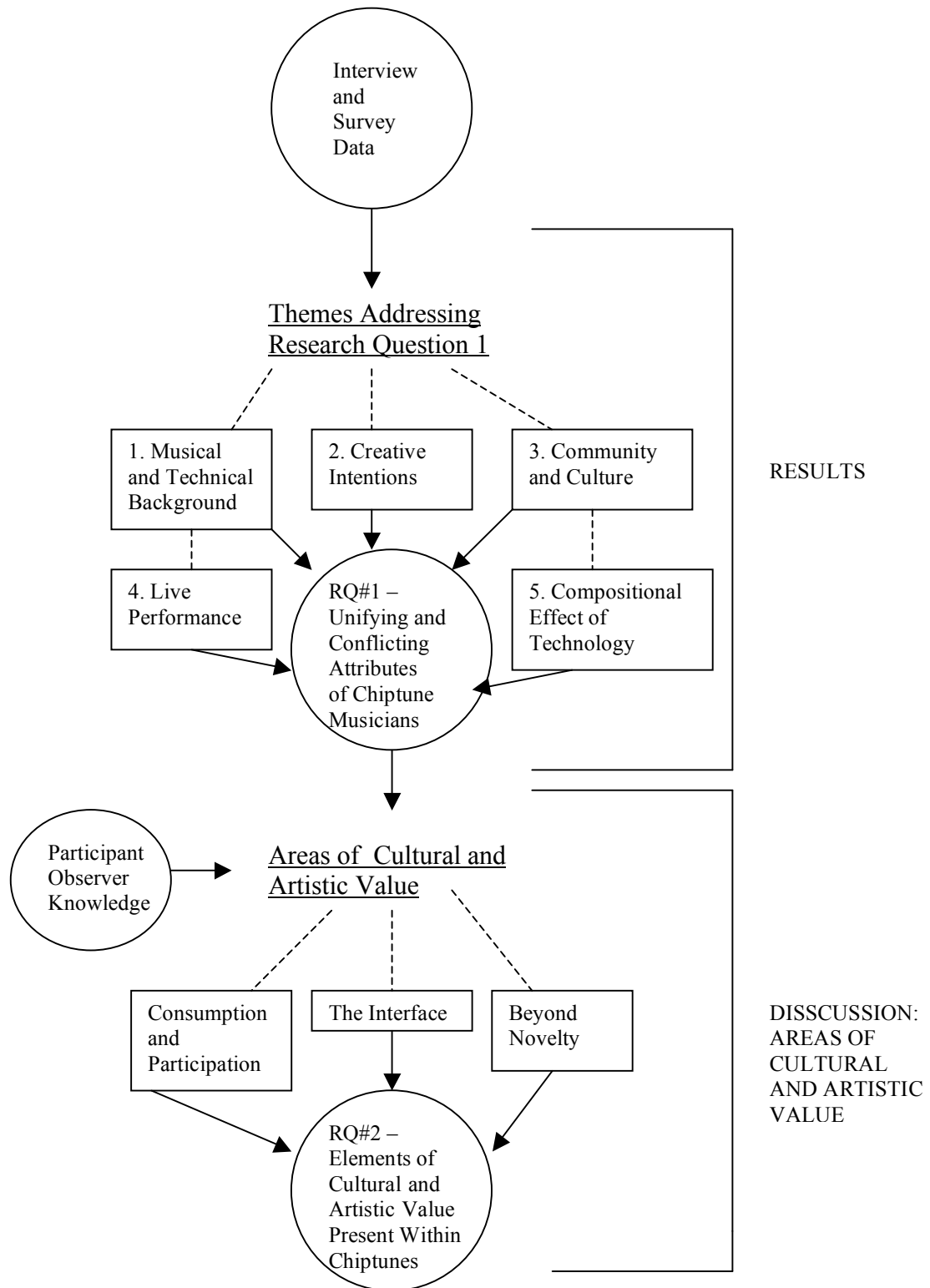
Figure 1: Research Project Concept Map

Figure 1 explains how the results from the interview and questionnaires will be presented; it is a concept map that visually depicts the structure of the paper and the entire research project. It shows the survey and interview data leading to five themes that address the first research question. This is presented in the following *Results* section (p. 10). The information from the *Results* section is then analysed in relation to

my position as participant observer to discuss three areas of cultural and artistic value that address the second research question. These three sections present different aspects of cultural and artistic value within Chiptunes in the *Discussion* section (p. 20). So the two research questions are approached separately within the paper with the first adding to the discussion of the second.

Within the results, the participating artists will often be directly quoted or have their opinions referred to. This will be cited using the same referencing system as the rest of the paper. The question to which the artist is responding, will appear as part of the reference, for example (Pixelh8, 2007, A3), would refer to Pixelh8's answer to the third question, *Do you post-produce, mix and master your own recordings?* (refer to Appendix B for question numbers). This system will work for both the interviews and questionnaires. However, if any specifically new questions are raised in the interview, this will be discussed in text.

Results

The data collected from the interviews and questionnaires reveals details of the differences and similarities of various Chiptune musicians, and why their music is part of a significant artistic and cultural movement. The data gained from the interviews and questionnaires will be presented in five themes which arose from analysis of the musicians responses. These themes address the trends of unity and contrast within the participating Chiptune musicians' interview and questionnaire answers. This data will shed light on the first research question, *what are the unifying and conflicting attributes of modern Chiptune musicians?* That will, in turn, provide a greater understanding of Chiptune music and culture.

1. Musical and Technical Background

Out of the seven Chiptune artists questioned, only two had a high level of musical training within their education. The majority had backgrounds in untrained pop or rock music that progressed into basic electronic music production, and from there to Chiptunes. One artist had absolutely no musical background whatsoever: the artist Småm, from Gothenburg, Sweden, only made music with loop-based programs such as Garageband before beginning to make Game Boy music with the software LSDJ (Småm, 2007, A4), meaning he had no musical theory knowledge at all, and has taught himself the basics of what sounds good in music through the Game Boy. Interestingly,

when asked if LSDJ has broadened his musical knowledge, he said he recently perfected an aural pitch recognition test that may have had something to do with using the Game Boy (Ibid.). Similar situations are abundant with many newcomers who come to the music from a gamer or music fan background and teach themselves the programs and musical theory through trial and error. Bit Shifter, who according to a recent survey is currently one of the world's most popular Chiptune musicians (Rogers, 2007, p. 49), responded to the question of his musical background by stating "It's mostly characterized by total pursuit of impulse and total disregard for discipline or practice" (Bit Shifter, 2007, A4).

As mentioned, however, not all artists are like this. There are a few artists with highly developed musical theory and education. From my study, it was namely Pixelh8 (2007) who also creates experimental concert music, and within the questionnaire he listed Cage, Ligeti, Penderecki, and Schoenberg mixed with Sly & The Family Stone and Marvin Gaye as his main influences (A4). The other is Syphus (2007, A4) who has a strong history of academic study, recently completing a Masters degree in music, and who also teaches violin professionally.

In terms of sound engineering skills and technological ability, again, the majority are self-taught. This information came from the third question: *do you post produce, mix and master your own recordings?* To which the answer was always, yes. However, they often do not have experience or training with audio technology. Predominantly they learn techniques through self-education and online communities. 8bit Weapon (2007, A3) does outsource all their mastering. This is primarily due to the commercial nature of the group's CD releases, which are still completely independent. Syphus raises a point, which is discussed in great detail in his Masters dissertation, that if he is releasing the song as audio, he will mix it using various techniques to get a good quality sound and then compress it to MP3. However, when using some varieties of Chiptune software, you can export the file in its module format, which is much smaller than an MP3 and can be reopened in the software to actually see how the song was constructed (Syphus, 2007, A3). In this case, no post-production is required. Whilst Pixelh8 does record, mix, and master with various pieces of modern software, he never adds 'special' effects, such as reverb or chorus. This is to keep the sound authentic to the original sound of the machines (Pixelh8, 2007, A3). To completely contradict this, however, Henry Homesweet (2007), who is a young developing artist, uses guitar pedal effects to make the Game Boy sound less Lo –Fi and different, which in his opinion is a good thing (A3).

For some Chiptune musicians, electronics and programming skills are an important element of creating the music. From my study, the key example is Pixelh8 (2007), who although being self taught by "opening up machines and reading technical documents off the Internet" (A4), was able to program an entire album worth of material from scratch for a whole plethora of Chiptune machines. This has resulted in Pixelh8 actually choosing to sell some of the programs so they are available for the rest of the Chiptune community, such as the Game Boy real-time synth Pixelh8 GB Music Tech. There is also a connection between Chiptunes and Circuit Bending, which is a process involving electronically modifying toys or instruments so they make new sounds. Many Chiptune musicians will use a Circuit Bent toy in their set up and a large number modify (mod) their Chiptune instruments (Pixelh8, 2007; Syphus, 2007). The most common of these is the Pro-Sound Mod for Game Boy. This is an electronic modification that allows for a lower noise floor and extra output level from the Game Boy headphone jack. I personally have done this modification following instructions linked from one of the community websites and, even with no electronic experience it was rather easy. Whilst some of the studies' participating musicians have so far avoided electronics and modifying instruments, they have interest in it and, within the community, it is an encouraged past time.

Within the musical and technical backgrounds, no two Chiptune musicians seem to be the same. The most unifying attribute is that, generally, all of them record and mix their own material at home, whether they are experienced or not. However, in terms of musical training and aesthetic preference, artists seem to come at it from many different directions, being attracted to it from backgrounds with creative similarities, as opposed to direct sonic or technical similarities.

2. Creative Intentions

There is one main reason quoted by most Chiptune musicians as to why they are creatively attracted to Chiptunes, that is, the exploration of the limitations of a piece of hardware or software. For example:

I think that the charm of this kind of composing is the limits – Småm (2007, A1)

I discovered that, creatively, I work best when working under technical constraints and limitations. – Bit Shifter (2007, A4)

> …I also like pushing machines to their limit. – Pixelh8 (2007, A5)

> I love the fact that your limited as to what you can do and the sounds you can make. – Big Chip (2007, A5)

However, again, this is not the case across the board for all musicians. Henry Homesweet, who is a relative new comer, gives a perspective that seems to reflect many of the younger generation of Chiptune artists. Instead of replying to the fifth question, *why do you compose Chiptunes?* like the examples above, Henry Homesweet (2007) replied, "Because it is fresh, new and exciting, I know there are hundreds of other chip musicians but there are millions of people out there who still haven't heard it" (A5). Interestingly, Chip music has been around for many years and so it is not exactly 'fresh and new', but, relative to the newcomers, it is perceived as something new. It is this cultural reasoning, as opposed to a musical creative reason, that seems to attract many newcomers and will be discussed later.

The other most common reason relates to the timbre of Chiptunes. As already mentioned, this is the most defining characteristic of the genre, and for a variety of reasons is an attractive creative element of Chiptune music. Some quote the nostalgia of the sound (Pixelh8, 2007; Syphus, 2007) or the happiness and warm friendly quality (8bit Weapon, 2007), others, the distorted crunchy noise aspects (Big Chip, 2007) and surprisingly, none specifically mention videogames. Even though the nostalgia and happy aspect may come from a semiotic link in the sounds to videogames, it is not as important part of the music as may be surmised. Most Chiptune musicians would not call themselves 'gamers' and only occasionally play specific games. The only time videogames are specifically mentioned was in regards to interview questions where I mentioned them first (Big Chip, 2007; Småm, 2007). This can also be seen in the discussion boards with very few, if any, posts about videogames.

The unifying aspects in regard to the creative intentions of Chiptune musicians are quite evident. The limitations imposed by the technology are generally the most common response, followed closely by a passion for the sounds and for some, especially the newcomers, it is about joining an exciting new cultural movement.

3. Community and Culture

The sense of belonging and community is quite strong for most Chiptune musicians. The two online communities this study focuses on, *Micromusic* and *8bit Collective*, have a history that contributes a lot to the feeling of community and creation of culture present within Chiptunes. *Micromusic* has been around since 1998 and is an incredibly strong community By 2000, they had progressed beyond the Internet, and began organising community based concerts and CD releases. The website operates with the text based material being supplied by all members of the community in a format similar to a discussion board or a wiki. The only audio content that is posted, however, must first go through what is labelled the Quality Filtering System (QFS). The QFS is comprised of senior members and creators of the website moderating the audio content supplied by *Micromusic*. The problem with this is that 'quality' is a subjective term and what makes a good Chiptune may be different for many people. This means *Micromusic,* whilst providing a solid community with only high quality downloads, lacks wide diversity and often puts newcomers off with the elitist nature of the community. An example of this is the fact that a digital download compilation, released in 2005, entitled Dissed by the QFS, contains a variety of Chiptunes that were often more aggressive or more abstract than what can be found on *Micromusic*.

8bit Collective is a recently newcomer and started off as a small discussion board and upload site called *Game Boy Music Mall*. Its current incarnation is increasing in popularity and is one of the most active Chiptune based community websites. The aim of 8bit Collective is to provide a space for music, image and video uploads, as well as a discussion board. The ranking and ratings system was abandoned early on, in favour of comments only; this promotes more personal discussion and encouragement for improvement instead of shutting people out or being competitive. It rewards creativity and originality above all else and, from that, it appears to be a community that will create and nurture future artists in new directions for Chiptunes. I joined *8bit Collective* in its early formation and currently it has many active members, with newcomers interacting with veteran artists who are often the latter's idols.

All the artists I interviewed are now members of *8bit Collective* (except Pixelh8) and most have been involved with *Micromusic.* Most of them have a sense of loyalty to the Chiptune community, gained through online interaction that often leads to real life releases, concerts or collaborations. Big Chip (2007) says he composes equally for the music and the community, meaning a large part of writing the music is not self gratification, but to feel you are contributing to a community which will inspires others

to participate (A5). An example of this is Henry Homesweet (2007, A4) stating that he learnt everything he knows about Chiptunes through discussions with Big Chip.

Question 7 of the questionnaire, *Do you feel there is a 'generation gap' between the demo/mod scene and new artists who don't program/hack?* was written to establish whether or not the modern Chiptune community has a connection to the demoscene. Bit Shifter (2007) says he is only distantly aware of the demoscene but respects the skills they have (A7). Henry Homesweet and Big Chip were mostly unaware of the demoscene and so did not answer this question, this, in itself, showing that the generation gap definitely exists for the newer community members. Because of the prevalence of the demoscene in Sweden, Småm (2007) has many friends who are part of it and says that, whilst laughing at his ignorance in technical knowledge, they are all the same in that they are doing it due to a love of Chip music (A7). This is a sentiment that is echoed by both 8bit Weapon (2007, A7) and Pixelh8 (2007, A7). However, the only surveyed musician who has actual experience and connections within the demoscene is Syphus. Syphus (2007) believes that there was "a level of understanding of, and synchronicity with those who *did* the programming and hacking which conceivably does not exist today in many of the newer communities" (A7). So, in essence, there is a gap brought on namely by the Internet and ease of access to information and software (Ibid.) This means that, whilst the demoscene is responsible for much of the infrastructure on which modern Chiptunes are built, it seems that it has become quite a separate community. However, it is a noticeable phenomenon that, as newcomers become more informed of the history of Chiptunes, they develop an interest in the demoscene. This has been leading towards a reunification of sorts and they are by no means destined to remain disconnected.

4. Live Performance

An interesting aspect of Chiptunes is the amount of live performance involved, especially for an electronic music genre. The first question about equipment and whether it *differs between live and composing contexts*, was included because it is assumed that Chiptune musicians perform live or wish to. This assumption for this study was correct, with all participating musicians sharing thoughts on what equipment they use live. In general the live gear used is the same as composing, sometimes with minor simplifications (8bit Weapon, 2007, A1; Syphus, 2007, A1). This means in most cases the video game console are plugged directly into speaker systems, becoming an important element of the performance.

This particular theme has no real discussion or disagreements amongst members that I have come across. If you compose Chiptunes you also want to perform them live. The actual performance depends on the hardware and software used. Someone like Syphus (2007), who generally uses programs on non-portable machines, often has a set up involving a machine for playback and maintains moderate control over some parameters so as to be able to improvise 'on the fly' (A1). For Game Boy musicians, a live set up can be as easy as Game Boy plugged directly into the mixing desk. Both Game Boy software applications allow for the ability to control or manipulate various factors live, such as triggering loops, however Småm believes that just playing sequences back and pretending your doing something is something of a live standard for Game Boy musicians. This is partly the case. However many incorporate other elements into their performance, for example Henry Homesweet's (2007) use of guitar effects pedals (A1), and Bit Shifter (2007) use of two synchronised Game Boy's switching between the two. 8bit Weapon (2007) has three members and their live set up consists of playing backing tracks from a laptop and then layering other parts on top from a large array of Chiptune instruments such as Game Boy and Commodore 64 (A1). Big Chip (2007) synchronises his Game Boy and Nintendo Entertainment System via a laptop to both compose and perform live (A1). He also experimented with using a Nintendo Wii Remote, which is a very new piece of technology for the latest Nintendo videogame console that is a motion-sensing controller, for controlling various parameters of the music (Big Chip, 2007, A1). This inclusion of modern technology in amongst the retro sound chips is not at all uncommon.

Pixelh8 (2007) fits into this mould, even though he does not wish to forever. He currently uses a sampler live, as playing all his various machines at once is nearly impossible. However, the piece of software that he created for Game Boy allows for real time playback of notes or effects using the Game Boy buttons, which adds a lot to a live performance as then a musician is really playing the Game Boy like an instrument (A1). This software was created due to the amount of Game Boy musicians that perform live, and it was intended to provide a tool for more real time interaction with the machine.

5. Compositional Effect of Technology

It seems most Chiptune musicians are very aware of the choices and constraints placed on them by using limited hardware (see *Creative Intentions*, p.12). How this actually affects their compositional technique and style varies. Some use a compositional technique common to most music composed using technology and that is a mixture of trial and error and spontaneity. For example when asked Question 2, *Can you outline your compositional process? Does the Technology used affect this;* the following answers were given:

Spontaneous, I sort of pick up any part of hardware I fancy using and just keep going till I get something (Big Chip, 2007, A2).

[It] involves playing around with equipment and software until a pleasing basis for melodic, harmonic or rhythmic patterns comes into being (Syphus, 2007, A2).

The composition process is usually pretty spontaneous, it's rare for me to pick up the Game Boy with a preconceived notion of what I want the end result to be (Bit Shifter, 2007, A2).

This particular technique allows for the technology to be a large part of the composition as Bit Shifter (2007) wrote, "it's like collaborating with the program and hardware, there's a bit of back-and-forth between the device and the operator" (A2). This solid use of technology to not just aid the process but become part of it has various effects to the outcome. For example, Big Chip (2007) said that when using different hardware it affects the stylistic outcomes of the music not just its timbre, due to the process of composition (A2). Bit Shifter (2007) gives a specific example relating to the two main pieces of Game Boy music software, LSDJ and Nanoloop.
He wrote "LSDj is note-based, utilizing traditional note designations (C, C-sharp, D, D-sharp, etc.), and I find that most of the tracks I do in that program end up being more melodic, pop tracks" (A2). LSDJ has a layout that is what is referred to as a Tracker. Trackers are a common early computer music sequencing program, the defining feature of which is the sequence runs vertically from top to bottom and note values are then

assigned, instruments changed, and effects added within this vertical table as identified at Figure 2.

Figure 2: LSDJ Interface

In regards to Nanoloop, Bit Shifter (2007) wrote:

> Nanoloop's interface is abstract and almost entirely graphical, using no traditional reference points for sound or pitch parameters. In my experience this is really liberating, it sort of triggers a different way of conceptualising and approaching music creatively. This allows me to sidestep the traditional methods of approaching music that I've always been entrenched in, and makes the whole experience much more about exploring sound, rather than melody. So those tracks end up sounding more abstract, and based around texture and rhythm, rather than overt melody (A2).

So this is showing that, through using different software, the different conceptual layout leads to different creative results. Nanoloop's graphical representation (see p. 19, Figure 3) lends itself to a more abstract way of composing, and LSDJ a more melodic style. Even though both LSDJ and Nanoloop are versatile enough to make both abstract and melodic music, the conceptual models behind them lead to a different way of composing (Bit Shifter, 2007, A2).
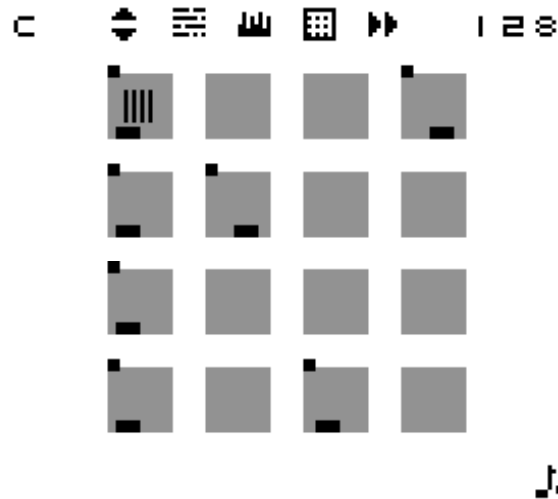
Figure 3: Nanoloop Interface (Witchow, 2007)

A key point about the Game Boy is its portability. This is why question 8; *Do you compose with the Game Boy portably in public/irregular surroundings? How do you find surroundings affect composition?* was included in the questionnaire. This question was generally answered by saying that they do take advantage of the Game Boy's portability but the surroundings have no real affect on the composition (Bit Shifter, 2007, A8; Pixelh8, 2007, A8). Småm (2007) feels that he cannot concentrate when there are people around him, although he does take his Game Boy wherever he goes (A8). This idea, of being able to take a compositional tool with you so if you suddenly come upon an idea you can put it into practice, is a new and interesting concept. Syphus (2007) may not use a Game Boy, but he takes advantage of the portability of a PDA with audio software, so if he comes up with an idea for a melody at anytime, he can whistle it into the microphone and transcribe it later (A2).

One of the most interesting insights into the affect of technology on composition came from Pixelh8 and his self-made programs. Pixelh8 (2007) believes that the affect technology has on composition is so strong that he would prefer to have complete control over the instruments he uses. He provides the following analogy to explain this.

 if you were painting a picture you wouldn't ask someone else to choose your colours would you? (Pixelh8, 2007, A2).

So he programmed his own software to be able to control various machine's sound chips in real time. This way, there is an instantaneous connection between composer

and machine, leading to a composition style a lot closer to working with an acoustic instrument.

In summary, the previous results covered many different areas relating to modern Chiptune musicians. In relation to the first research question, *what are the unifying and conflicting attributes of modern Chiptune musicians?*, the findings revealed not so much definitive answers, but some interesting generalised comments:

- They come from both experienced and inexperienced backgrounds

- A majority create the music due to its limitations and/or timbre.

- Most are detached from the demoscene but feel part of a broader community

- All perform live or wish to

- Most musicians collaboratively work with the technology allowing it to affect compositional process.

Discussion: Areas of Cultural and Artistic Value

As shown in the Research Project Concept Map (Figure 1, p. 9), the following discussion will address the second research question; *what elements of cultural and artistic value are present within the Chiptune genre?* This will be approached in three separate areas that provide insight into different aspects of cultural and artistic value present within Chiptunes. To do this, the thoughts and opinions of the artists will be discussed and compared in relation to literature about composition, timbre, videogames and subcultures. This will also be commented upon from my position as a participant observer, providing my personal thoughts on the topic. There is not expected to be a definitive generalisation as the result, but an in depth discussion which will lead to an academic understanding of the topic and its related issues.

The word 'value' in relation to the arts has had many books and papers written about it and so my intention here is to provide a very brief explanation of the aspects important to this study. Most academics relate value in the arts to the aesthetics of, and meaning that is generated by, the art (Klamer, 1996; Regev, 1992). For this study, I am also interested in value in terms of applicability and usefulness as well as accessibility and originality. In the following section *Consumption and Participation* (p. 21), it is shown that Chiptunes present musical ideas closely related to experimental music Yet, it is generally accessible to the general masses This accessibility is a form of cultural and

artistic value. Within the section *The Interface* (p. 23), the devices used to make Chiptunes are discussed in relation to the semiotics of the physical devices as well as the applicability of the human-machine interaction to other art forms. Finally, the section *Beyond Novelty* (p. 25) will provide an in-depth discussion into the aesthetics and meaning behind Chiptunes and detail the aspects that makes it more than just a gimmick. These details reveal many elements related to applicability and originality, overall providing a thorough overview of the artistic and cultural value of Chiptunes.

Consumption and Participation

When I first began undertaking this research I was of the opinion that the majority of Chiptune musicians had a musical background similar to mine, that is, having a previous background in experimental electronic music and electro-acoustic composition. The connection at first seems obvious, as Chiptune music can be seen as deriving from many experimental concepts, such as found sounds and 'noise as music' which can be seen as early as the Italian Futurists in 1912. For some artists, this is the case. As seen in the results, the Chiptune artists Pixelh8 and Syphus are both classically trained. Also, another artist with similar background is Bubblyfish. She has a background in Classical piano and has often played Game Boy music for high art functions (Bubblyfish, 2007). Also the main venue in New York where Chiptunes are performed, The Tank, is an experimental music venue. However, as the results show, the majority of Chiptune artists who participated in my study had very little if any technical musical background. This expanded my initial conceptions of Chiptunes being created as a form of experimental art music to encompassing a whole range of artists with varied musical backgrounds.

The reason for this large variation in participants is due, I believe, to the genre's online presence. It has been discussed that the Internet and digital technology has created a type of cultural democracy, allowing new opportunities for both individual and collective expression (Cunningham, 1998, p. 144). This democratisation has led to an "age of the amateur" (Lessig, 2005), where everybody can participate in creative culture. This new widespread participation can especially be seen in the fairly recent proliferation of social networking sites such as Myspace and Youtube, which contain entirely user-generated content and generally promote youth to not just consume but participate in culture (Boyd, 2007). The phrase often used to describe these people is 'prosumer' being an amalgamation of producer and consumer, however it also applies to the marketing of products of a professional consumer level. Therefore I prefer to use

the phrase 'creative consumer'. Within Chiptunes, it is clear there are many creative consumers, the community having strong connections with social networking and the majority of the people that listen to the music also creating it. It is a participatory subculture and its recent revival can be seen as a prime example of the rise of the creative consumer. Hence, many amateurs and people who just enjoy the music begin creating it, accounting for the diversity in musical and technical backgrounds of Chiptune musicians.

An interesting point to note is that, within videogame culture, to which Chiptunes is tenuously attached, creative consumption has been of central concern. Unlike most other commercial art forms, videogames generally support the involvement of the consumers within the creation process. This can take the form of releasing a Beta (early version) of a game for fans to test and comment on. But namely, it involves the games company releasing the software engine with a game so users can modify or recreate game content. This has led to user generated content actually becoming entirely new game franchises and is generally the way beginners start their path for a career in the games industry. As Zimmerman (2003) wrote, videogames are "a democratic art for a democratic age" (p. 2). The openness of reinterpretation within the videogame industry has led to an entirely new emerging art form called 'Machinima'. This involves using a videogame to create films and, in recent years, these have become increasingly popular. This was due namely to the game *Halo* that, because of its online features, players began to be creative instead of just shoot each other (as is the actual aim of the game). This has led to the most recent version of the *Halo* franchise, *Halo 3*, allowing players to record any play sequence onto their hard drive and then control camera angles in anyway they desire. This was as a direct reaction to the Machinima movement. There are many similarities between Chiptune composers and Machinima filmmakers. They both use already existing videogame technology and reinterpret it for self-expression. The key point here is that the videogame industry is not only supportive but also conducive to the re-interpretation and creative use of technology. There is some speculation as to whether the recently released Nintendo DS game *Electroplankton*, which allows players to create melodies and sound scapes, was created with a firm knowledge that it would be utilised by the Chiptune community.

So, as stated, Chiptunes share many characteristics with experimental music, yet it remains accessible. It can be seen as being accessible due to the rise of the creative consumer and also the openness of the videogame community. This accessibility of an emerging and experimental musical genre is a definite element of cultural and artistic

value as it is an exemplar of democratic culture, completely breaking any barriers that may exist between so called high art and pop culture. The participatory and community based nature of Chiptunes is valuable for the broader art and culture community as it encourages wide spread discussion of experimental and artistic philosophies, even though they may not know it, which in turn greatly enriches the work being created.

The Interface

From the very beginning of computer technology, programmers have felt a desire to create tools for human and machine interaction. Their ability to build an interface in which people feel comfortable directly communicating and operating a machine has led to such common devices as the keyboard and mouse. Arguably, videogames have always been a prime example of such interaction and hence videogame programmers are often at the forefront of such technology. Therefore, it is clear to see the importance and value of videogame interfaces to Chiptunes.

The concept of 'bricolage' describes well the relation between Chiptunes and videogame interfaces. Bricolage is putting things to use in ways for which they were not originally intended (Gelder, 1997, p. 88). Some may argue that when early computers first came out, one of their intended uses was to create music. However, when dealing with modern Chiptunes, it is clear bricolage is taking place as devices are used for performance and generally run on un-official software. From the wide variety of Chiptune interfaces, I am going to focus on the Game Boy for this discussion. This is because of its accessibility and the fact that it is a portable device created for videogames, and hence through using it to create and perform music it represents bricolage clearly and simply.

The Game Boy as a musical interface has come to be a symbol of modern Chiptunes. For example, see Figure 4 (p. 24), which contains various CD covers and community related images that appropriate the Game Boy as a symbol. Because of the widespread exposure of the Game Boy, it is a recognised symbol with a lot of semiotic meaning already attached to it. People expect to hear videogame sounds when they see a Game Boy. By employing bricolage and creating self-expressive music with it Chiptune musicians are partaking in what Umberto Eco (1972) describes as 'Semiotic Guerrilla Warfare' (p. 105). This is the act of deliberately and subversively juxtaposing various semiotic signifiers; a perfect example is someone playing the Game Boy musically in a performance. Here the audience is bombarded with two very conflicting signifiers, that of a musical performance and that of someone playing a videogame. Semiotic guerrilla

warfare can also happen on different levels. For example, renowned Chiptune musician David Sugar said; "the thing I'm interested in is that the Game Boy is a huge capitalist icon...It's like the pinnacle of the consumer world as it doesn't serve any purpose other than entertainment. It's just about pure consumption." (Itchy Leeds, n.d., para. 5). So here David Sugar is using the semiotic juxtaposition of a tool designed for commercial consumption with the participatory and political nature of a rock concert.

Figure 4: Examples of Game Boy symbols in Chiptune Culture

From L-R, Top-Bottom: Boy Playground CD Cover (Relaxbeat, 2007), Customised Game Boy (JW86, 2007), 8bit Collective Logo (8bc, 2007), Nanoloop 1.0 CD cover (Discogs, n.d.)

The Game Boy as a symbol has become a point of fixation within many parts of the Chiptune community. For example, on *8bit Collective,* people show off images of their customised Game Boys (the middle image of Figure 4 is an example), their large collections of different varieties, or their rare and good condition models. What furthers this retro-gear fetishism in an ironic way is the fact that the oldest model original Game Boy has the best sound output quality.

When trying to discover what most attracted people to this music, as can be seen in the results section, generally I received answers relating to artistic intent and the timbre. However, something I have observed that did not come directly from the results is what Syphus (2007) refers to as "technofetishism"(A2), the fact that people like making this music because of its connection to gear like the Game Boy and its use as a musical interface. In one particular discussion thread on *8bit Collective,* members discussed the differences between using the actual game hardware and using emulators. Nanogrrl (2007) wrote the following; "For me the portability of the Game Boy is what mostly attracts me. I love that I can make music anywhere with it, and it feels like a toy. So for me it is less about hardware vs software and more about interface." The level of attachment and adoration I have mentioned of the Game Boy coupled with the easy to

use and portable nature of the interface makes it an incredibly powerful example of human to machine interaction.

Finally the importance of interface can be seen by the Chiptune community's acceptance of various more modern technologies. When trying to define Chiptunes for this paper, I began to find it exceedingly hard as there were some songs and artist that did not contain the same videogame timbre that I have quoted as being a unifying characteristic of Chiptunes. These songs and artists are seen as part of the same community and genre because of the interface they were made on. For example, a song created using the new Nintendo released program Elektroplankton, was included in a popular Chiptune compilation. Also many Chiptune artists use various videogame interfaces such as joypads and controllers attached to computer software for musical performance. This embracing of human to machine interaction and performance is applicable to all electronic and digital arts. The artistic and cultural value of this applicability is very relevant and it is hoped that Chiptunes will influence the broader art community into embracing performance in terms of human machine interaction. Also, the meaning expressed and conveyed through the use of bricolage and semiotic guerrilla warfare is valuable in pushing the boundaries of art and culture. Generally, the Game Boy as an interface is important in creating meaning for Chiptunes and hence reinforces its credibility as a valuable art form.

Beyond Novelty

On many people's first encounter of Chiptunes, they automatically think of it as a type of novelty. However, music that relies solely on novelty and gimmick generally doesn't become widespread and once the novelty wears thin people move onto something else. The modern Chiptune revival has now been occurring for the past seven years (since 2000) and its community is constantly growing. As has been discussed in the previous two sections, there are many elements of value present within the genre that make it go beyond just being a novelty.

As this study's results showed, two recurring themes arise in regards to musicians' creative intentions. That is they write this music due to the creative nature of working with limitations and semiotic attachment to the timbre and interface. This is reinforced on the 8bit Collective Forum, in the thread, *why do you make chip music* (Boomlinde, 2007). The value and importance of these themes provide solid reasons for Chiptunes being more than just a gimmick.

There are many limitations present when composing Chiptunes. Firstly, there are only a certain number of channels to work with. In the case of the Game Boy, there are four: Pulse 1 and 2, Wave and Noise. So techniques are developed to make the most of those four channels and their timbres. There are also rhythmic restrictions, depending on the software used. These limitations relate to Chiptunes being a participatory art form. Chiptune composers gain a lot more from listening than an average consumer. This is because, after working with the limitations, you become familiar with the sounds and know what is possible and easy to acheive, and what is difficult or original and deserves admiration. This further builds and develops both the community and the quality of work produced, as the limitations allow for a simple shared understanding, which is how the demoscene has operated for years and how it continues to be a system conducive to high quality creative work.

Deliberately composing with limitations is not something new and exclusive to Chiptunes. Interestingly, it is also a point that reoccurs in literature about electronic art music. For example, in regards to composing music with self-imposed limitations, the author Waters (2000) offers the following insight:

> An inability to keep adequate mental grasp of the vast amounts of potential musical material available for a given compositional decision has a crucial impact on composing practice, in the sense that what is technically possible often transmutes into what is aesthetically desirable (p. 58).

This statement was made in regards to electronic art music. However, it is highly applicable to all forms of digital expression. The computer has given rise to endless options that are constantly driven by capitalist ideals to get bigger and better, and hence, provide even more options. By self-imposing limitations, Chiptune composers are freeing themselves from this cycle, and hence, providing an environment more conducive to self-expression. For example, on *8bit Collective,* one Chiptune artist wrote "it's funny how if you have unlimited options you end up doing nothing" (Boxcraft, 2007). This is essentially a rewording of Waters (2000) statement revealing that Chiptune artists are well aware of the creative possibilities gained by working with limited technology.

As mentioned, other than the limitations, the other theme is the timbre. Early videogame sounds have an array of semiotic meaning and, as discussed in the previous section, this is put to use by juxtaposing the meaning with new self-expressed meaning.

However, there is something deeper than just the semiotic attachment to nostalgia present in videogame sounds. The electronic art music composer Emmerson (2000) provides an interesting insight into what makes videogame sounds unique.

> [Early videogame] sounds gained an immediate social dimension: they always had precise semiotic function with respect to the game they 'inhabited' indicating simple moves or complex outcomes. The ubiquity of such games added another level of signification; the sounds entered the urban soundscape for both the individual and collective memory (p. 201).

The sounds are socially accepted as being indicative of virtual worlds, and hence, the modern youth, who have claimed the virtual world as their domain, relate to and utilise these sounds for self-expression. This statement also reveals the fact that many of the sounds had a semiotic function within the game; a well-known example is that of a short ascending pitch glide (a kind of 'boing') is used to represent the sound of jumping. It is interesting, then, to see these sounds juxtaposed within music sometimes in reference to the original semiotic meaning and sometimes to subvert it. The uniqueness of these sounds and their existence within the collective consciousness as being related to playing, sets Chiptunes apart from many other genres of music and truly shows it has the potential for further development. This uniqueness and depth of semiotic meaning reveals layers of cultural and artistic value that transcend any negative connotations associated with any novelty aspects.

Both the creative use of limitations and the unique nature of the timbre show cultural and artistic value within Chiptunes. These themes include ideas discussed by electronic art musicians and are a lot deeper than just another gimmick. The depth of these themes, as well as the information discussed in the previous two sections, reveals how Chiptunes can achieve a lot more and will continue to grow in supporters and participants due to its wealth of cultural and artistic value. As mentioned, value exists in the Chiptune communities embracing of collaborative culture and blurring the lines of consumer and creator. It embraces technological interfaces both for artistic and cultural means, being that the interface can become conducive to artistic practice as well as being used as a semiotic statement through the use of bricolage. In general this level of artistic and cultural value makes Chiptunes one of the most original and innovative artistic movements of the 21st century.

Conclusions and Discussion

My initial prediction as to the results and outcomes of this research were very different from the final outcomes. On starting the research, I thought there were two key areas of interest within Chiptunes. Firstly, that it was simple melodic music being made by musical and technical elite. In reality, the musically and technically trained only make up a small percentage of Chiptune composers and therefore my point of focus turned to why it has such varied participants.

The other key point I believed to be important was the fact that it is a retroactive culture, a music that is looking backwards to create the future. However, it seems that whilst there are retroactive elements within the Chiptune culture, it is rarely discussed and all together rather unimportant. For example, as mentioned in the discussion on *Interface* (p. 23), modern tools can be used to the same effect and be equally as accepted in the community. The areas that revealed themselves as important were approached in the final discussion. These are areas with high levels of artistic depth and meaning that transcends discussion of old technology, in favour of general artistic philosophy.

As an aspiring performer and creator of Chiptunes, these findings create an air of optimism regarding the future of this music. Through conducting this research, I have come to understand my own artistic practice better, coming to the realisation that Chiptunes are an enjoyable art form to be involved with, not just because of the nostalgic semiotics of the timbre or any novelty factor, but because it is artistically satisfying as well as being a shared participatory experience. My position as a participant observer has provided me with inspiration and rationale for continuing to compose Chiptunes and advocate further academic research in this field.

It is hoped this research project will promote future studies into more specific areas of the genre such as detailed musical analysis, its relation to the broader music industry, and its use as an exemplar for studying cultural creation through social networking. Overall, this study has shown that Chiptunes is a valuable artistic and cultural music that is as diverse and complex as it is simple and fun. It is music highly electronic, yet somehow full of human memory and emotion. It is an accessible new participatory music for the future that has claimed cultural icons as its own and re-interprets them, that cherishes limitations and simplicity whilst avoiding being luddite, and it is music by "not commodity makers, but idea brokers" (Burke & McClaren, 2006), music that takes play seriously.

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Appendix A: Details of Participating Artists

8 Bit Weapon: (Questionnaire) 8 Bit Weapon is Seth, ComputeHer, and MelBot. This trio from Los Angeles has performed across two continents and have a number of high quality commercial releases. Often seen outside the Chip scene appearing at gaming conventions, the I Am 8bit art show and everywhere in between. They are currently on the Nerdcore 2007 International Tour.
www.8bitweapon.com

Big-Chip: (Interview) James Henderson from the UK, makes some random bleepy music using Nintendo consoles. He is a regular on 8Bit Collective and has recently released a digital E.P available from his website
www.big-chip.co.uk
www.myspace.com/bigchipmusic

Bit Shifter: (Questionnaire) Bit Shifter aka Joshua Davis is a powerhouse in the Chiptune scene. His Game Boy music is hard frenetic and incredibly dance friendly, as is his live show. Having performed over one hundred shows all over the world, being involved in large netlabel 8bitpeoples.com and having his name on many high quality Chiptune releases, as well as being a contributor to the organisation of Blipfest in his hometown of New York, it is no wonder he is a well-known legend within this genre.
bit.shifter.net

Henry Homesweet: (Interview) Henry Homesweet! is the artist name for Game Boy musician Tom Hedley from Ipswich in the UK. He is a regular on 8bit collective, and is playing shows regularly in his local area, for more details see
www.myspace.com/henryhomsweet
www.purevolume.com/henryhomesweet

Pixelh8: (Questionnaire) Mathew C Applegate creates Chiptune music in the UK under the name Pixelh8. He has performed through out the UK, also doing shows with pop artist Imogen Heap and currently touring the US. Not only does he create and perform Chip music, but he has also created programs for both Game Boy and ZX spectrum to add to the equipment available for other musicians.
www.myspace.com/pixelh8
www.hiddenyouthrecords.co.uk/p8musictech.htm

Småm: (Interview) Småm is Game Boy artist Simon Mattisson from Gothenburg, Sweden. He has released an EP entitled Spice Mix full of oriental style Chiptunes. For details on his regularly released new material check his Myspace,
www.myspace.com/chipstaticsmam

Syphus: (Questionnaire) Syphus is Brenden Ratliffe, a participant in the demoscene from the UK. He has extensive knowledge of trackers from C64 to Amiga. He has just completed his Masters dissertation on the topic of Chiptunes, and organises regularly large-scale Chiptune events in the UK.
syphus.untergrund.net/

Appendix B: Questionnaire

1. What equipment do you use to create your music?
   – Does this differ between live and composing context?

2. Can you outline your compositional process?
   – Does the technology used affect this?

3. Do you post-produce, mix and master your own recordings?

4. What is your musical and technical background?
   – Include what music other than Chiptunes, if any, you have been involved in

5. Why do you compose Chiptunes?

6. Do you feel particular loyalty to the Chiptune community?

7. Do you feel there is a 'generation gap' between the demo/mod scene and new artists who don't program/hack?

8. Do you compose with the Game Boy portably in public/irregular surroundings?
   – How do you find surroundings affect composition? (for Game Boy musicians only)

9. What in your opinion makes a good Chiptune?