

The Discourse and Culture of Chip Music

Studying the Methods and Values of the Chipscene

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ABSTRACT

This thesis tackles some of the complicated internal issues that has colored the chiptune scene. Through analyzing discourse in blog posts, academic material and online communication between chiptune practitioners it aims to define the current generation of chiptune musicians. Interviewing figures of interest has given insight into the aesthetic of chiptune and what is important to the current community. Analyzing the aesthetic values can give insight into the elements of the genre that is so difficult to define. The goal is to expand upon the work of Marylou Polymeropoulou (2014) and see it in context of my own involvement with the scene as well as the many reflections documented by academics. By gaining an understanding of how the different historical events and ideologies of chiptune culture has affected the discourse throughout the ages, we can perhaps define a new generation of chipmusicians. Most importantly, there are aspects of newer chiptune culture that has remained untouched in academia. This research aims to contribute knowledge on the aesthetics of the chiptune medium and culture, put in the context of Polymeropoulou's work. It will demonstrate the musical aesthetic that is often neglected in other articles. For instance, the tech-oriented aesthetic created on obsolete hardware that has recently influenced those creating chiptune music with modern tools, and vice versa.

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1 INTRODUCTION

1.1 The Basics of Chiptune

Chip music, popularly called chiptune, is a subgenre of electronic music that emerged from hobbyist programming and hacking scenes of the 1980's. Some researchers even trace it as far back as the introduction of the sound chip¹ in the 1970's. Traditionally, it has been described as music composed and performed on obsolete video game consoles (Tomczak 2008, Carlsson 2010). In essence, it is music made using electronically generated waveforms on obsolete hardware or with sounds reminiscent of early day video games. This hardware presents a variety of technical limitations that the composer can work around in creative ways. Over the years it has evolved from being produced and performed solely on these consoles to also being emulated² or sampled with modern tools for music production (Polymeropoulou 2014). While the genre has been noted to be a result of technology and the limitations involved in writing music with it, most approaches are today accepted as chiptune as long as it hits the right nerve (Carlsson 2015). These may include the use of DAWs³, Samplers⁴ and software synthesizers such as VST-instruments mimicking features of the sound chip.

Chiptune can play the role of an instrument just as much as a genre. Sometimes the obsolete machine is treated as part of a band and sometimes it is the studio workstation. This calls for a unique variety of live performances as well as a rich discourse on the creative approaches to the genre. It is not a genre defined by its musical content as much as by the sounds used, often having an 8-bit, synthetic timbre. (Carlsson 2015) For instance, subgenres like progressive rock or bebop tend to imply recurring elements in musical content and instrumentation while chiptune is more about adapting other genres to a low bit aesthetic. Low bit, a term that has seen some usage to define the music, applies to music that sees aesthetic value in opposing technological snobbery. Perhaps by creating music of bitrate, being a term used to describe the quality of a digital audio file, or perhaps recorded with equipment other would consider bad. Today Chiptune is not only explained as a musical genre, but as a culture with a clear social cohesion in a community of practitioners, both in real life and on the internet. As a

¹ Sound Chip: An integrated circuit found in some obsolete-computers. It generates the sounds used for their sound effects and music.

² Sound Chip Emulation: Certain software technologies like VST (Virtual Studio Technology) can imitate the sound of sound chips

³ Digital Audio Workstation: The DAW acts like the brain in most high-end studios as well as in home studios. It is a computer software that allows for recording, MIDI-programming and audio mixing. Pro-tools, Cubase and Ableton Live among others are by far the most popular tools for music production. The DAW can also host VST plugins like chip sound emulators

⁴ The Sampler is a common tool and instrument in electronic music that plays back sound recordings

genre, the description becomes complicated and unique from other genres. The musical content itself can be anything from noise to dance music and the chords or rhythms used are irrelevant to how ‘chiptune’ it is. It has therefore become an umbrella term for a vast variety of music genres utilizing the chip sounds. This has made it challenging to define aesthetics in the scene as they are often adapted from other genres. However, there are some recurring musical content that has manifested Chiptune as a genre on digital streaming platforms.

As a cultural phenomenon, musical genre and medium it has also changed a lot over the years in a dance between obsolete hardware and emulation. The chiptune aesthetic, unlike traditional descriptions of genres, exists not only within the music but also within the internal discourse of its community. For some, the *discourse of authenticity*⁵ has greatly impacted the chiptune community as documented in a dissertation by Marilou Polymeropoulou (2014). I aim to define a new generation of artists by researching and reflecting on current and previous transitions in values and aesthetics within the chipscene.

1.2 Introducing the Community

Behind the music, there is a community defining the aesthetics of chiptune. Through constantly making and releasing music, creating events for live performance and online communication people from all over the world fuel one of the main motivations for chiptune. In this community of practioners, often referred to as the *chipscene*, the performers, audience and enthusiasts of this culture create a strong sense of community. It is for many a motivation to contribute to the genre. A unique feature of the chipscene is that most of the members are musicians themselves or contribute to the scene via other media. They are creatives in celebration of this low bit medium, rather than fans. If not a chipmusician, they could be visual artists, writers, programmers, photographers, film directors, organizers, engineers and much more. The bond is in interest for chiptune and the culture surrounding it. Together, they make up for a rich and creative scene in celebration of its aesthetics.

The community thrives on the internet with social media communication on Facebook groups such as “Chiptunes = WIN” or message boards and media repositories like Chipmusic.org and battleofthebits.org (Carlsson 2015). Here, chipmusicians can create awareness of their work

⁵ The term authenticity is a complex subject with much research done in the realms of popular music and philosophy (see, for example, Allan F. Moore’s article ‘Authenticity as Authentication from 2002, or Hans Weisethaunets article ‘Authenticity Revisited: The Rock Critic and the Changing Real’ from 2010), but I will in this thesis not go into the differing discourses surrounding the term. I will instead relate to Marylou Polymeropoulou’s (2014) use of the term. In chiptune, the term is often used in context of whether or not obsolete hardware is used to create music.

and get thoughts and feedback on their work in the comment sections⁶. Chiptune music is often distributed towards the chipscene as opposed to the mainstream. The online community has been an important feature of the scene and a feeding ground for discourse and culture since the rise of micromusic.net in 1999 (Carlsson 2010). Utilizing chatrooms, video tutorials, blogs and media repositories the community share their musical work alongside knowledge and ideas. Music reviews and information of new music and events are typically found within community-driven blogs, as well as tutorials that help newcomers learn the many ways of creating music.

Since the beginning of the 21st century the chipscene gained widespread attention in mainstream media and, as a result, a large following of new musicians and fans. 2005 saw the rise of 8bitcollective, an online media repository and discussion forum. Reaching over 17,000 users it quickly became the most popular place for sharing and discussing chiptune as the self-proclaimed “first completely open free chiptune-related media repository” (Carlsson 2010). Many real-life events and festivals were established around the same period and new multimedia and mainstream media articles attracted new interest towards the cultural phenomenon. In America, Blipfest was held annually from 2006 to 2012 and often covered in documentaries. Europe also had its own editions of Blipfest next to its own festivals such as Eindbaas in the Netherlands. However, Europe has often been considered the continent where chiptune music has been evolved and practiced the longest. Today, there is a number of festivals and parties all over the world. As one festival disappears two more seem to show up. Video Game related conventions such as PAX and Magfest⁷ have attracted the biggest crowds. The latter usually capping its numbers at over 20,000 visitors and running multiple chiptune events. Square Sounds festival has been held in Melbourne and Tokyo annually since 2013. 8static fest is a monthly festival in the USA celebrating and showcasing chiptune music. Independent organizations such as Forest Booking organize events in Russia and Europe for chipmusicians to travel and perform at. It is a rich live scene in all corners of the world with artists often crossing the continents to attend and perform at them.

The community is being mapped out by members of Chiptunes = WIN on a private google map, showing city or country of residence of chiptune artists and related communities.

⁶ Comment sections are a typical feature of the social media and media repositories used by the chipscene and has been an important feature of the platforms used. Discussions on aesthetics thrives in these and defines many values of the community.

⁷ Music and Gaming Festival: A convention for video game culture and music held annually since 2002. Since 2012 it has used the Gaylord National Harbor Convention Center in Maryland.



Figure 1. Screen capture of the community built google map showing Chiptune artists. One point can be one or more artists. Curated by Chiptunes=Win and still being updated (Hood 2013)

To some it might seem to be a genre that are reserved those well informed on electronic music, underground culture or retro gaming. However, this misconception will disappear the moment you pass through the doors of a chiptune event and meet the community. The fans and musicians alike are coming from all walks of life but seem bonded by enthusiasm for a niche. Even though there seems to be a majority of young males, the acceptance for personalities of all ages, sexes and interest is astounding. The long history of chiptune and the different relationship people of all ages have to the old technology makes for a colorful combination of people. However, there are certain elements that create division in the community. This thesis will tackle some of the touchy themes that the community has dealt with throughout the 21st century.

With some more or less fortunate exceptions, the chipscene has received generally little coverage and attention in mainstream media. Only a handful of its artists have, in the industry’s understanding of the term, truly *made it*. Commercial success has however not been the goal for chiptune musicians. As of today, it is a community celebrating the many approaches to the art form and equality in creativity regardless of taste and personal

background. To the chipscene, the music is an intellectual challenge within limiting formats but more importantly a format with many aesthetics and a sense of social cohesion.

1.3 Introducing the Issue

Carlsson (2014) reflects on chiptune comparing it to Folk music, saying “You have a feeling you know what it is, but if you start to explain it you’ll run into trouble quite easily”. The common descriptions are process-oriented and in regard to the methods used for writing the music. Both in academia and in mainstream media it is defined by its usage of obsolete technology. The motivation to create chiptune has been explained in appropriation of technology not meant for music creation and a culture for anti-consumerism (Tomczak 2008, Carlsson 2010). Other obsolete machines be it calculators, toys, door bells, greeting cards, whatever has a low technologic, 8-bit⁸ or in any way nostalgic feel to it are welcome within the aesthetic today. This has not always been the case. Before the popularization of chiptune, as well as throughout the 2000’s, the online forums and social medias were filled to the brim with debates on what chiptune truly was. A majority of artists and chiptune enthusiasts from the early days are explained to inhabit a purist ideology (Polymeropoulou 2014). Carlsson explains, “there was a conflict between those who saw chipmusic as a style, aesthetics or genre and those who saw it as a consequence of technology” (Carlsson 2010, p. 11).

The technology used in the process of writing and performing the songs is what historically has defined chiptune as a genre (Carlsson 2008). Today however, some contributors to the genre will argue that this no longer covers the important aesthetic values of chiptune. Just like in Folk music, there are certain instruments that you associate with the genre, but you do not necessarily have to use them. In chiptune it becomes even more complicated as there are few musical elements that support its definition as a genre. Therefore, different ideologies of what *authentic⁹ chiptune* was have continued to debate up until recently without really coming to a conclusion.

The issue for the purist is that a large part of the community believes chiptune can be made on any type of technology, blurring what they experience as real chip music. They have called it

⁸ 8-bit: refers to the 8-bit processors commonly used in obsolete video game consoles

⁹ Authentic Chiptune; Authenticity is a highly complex issue with much academic work defining it. In my thesis Authentic Chiptune only applies to what the different ideologies of the chipscene allows to be called Chiptune music

inauthentic or fake, resulting in the term Fakebit¹⁰, which is still being used to describe emulated chipmusic. Naturally, contributors to the scene that have expressed opposition to music written without obsolete technology have been categorized purists and elitists, but within the purist ideology there are variations. Unfortunately, provocations from both sides have colored the continued discourse within the community. Painful memories of heated debates with statements that may have provoked the other side has affected the outcome, yet I believe the discussion should be continued and concluded. It is important to note every perspective on the genre is individual and unique, so I find it important to discuss this issue with a more positive tone. The goal is to create common knowledge of history and practice, not a common opinion.

For some, *real* chiptune might even need to trigger valence by being upbeat and melodic. The fact is, chiptune is a genre of many descriptions and with a discourse between many understandings of what it truly is (Polymeropoulou 2014). It is also argued by artists to be less of a genre and closer to an instrument or cultural phenomenon. In a blog post about Chiptune in 2015, Carlsson (2015) suggests the phenomenon is no longer a genre. Furthermore, chiptune has undergone many transitional phases since the term was first used. Tomczak (2008, p. 3) explains an importance of using obsolete hardware as opposed to emulation to be authentic. The history of this theme has been covered in depth in the dissertation by Polymeropoulou (2014), but I believe there is more to the historical discourse than hardware versus emulation. It is also culture versus music. Some artists have explained discontent with the focus on the medium and not on the emotional expression and messages of the music. However, the relationship between hardware and software will be important to define what the current generation considers authentic chipmusic.

Emulation of sound chips is always a touchy topic for chiptune artists. However, when one sees the game system as an instrument similar to a violin then it is easy to see why musicians are so particular about the sound. I believe it comes down to subjectivity, but there is something to be said for the nonlinear sound that comes from the actual hardware instead of an emulation that has a real difficulty with analog circuitry. When listening to the sound of real SID chips in comparison to an emulator, I find that there is a richness to the sound quality of the original chip that is inspiring to work with, in contrast to the sound of an emulator. Each time a song is played, it is slightly different on the real chip, providing it with a certain mystery and life. (Paul 2014)

¹⁰ On a personal note I am heavily against this word due to it implying inauthenticity within itself. Due to common use and collective understanding I choose to use it in my thesis either way.

Today, the chiptune scene and community seem to accept sampling and emulation of chip sounds using modern production tools. This is often labeled as *Fakebit* as long as it aims to be considered chiptune. However, some refrain from using this term as it, in itself, implies inauthenticity.

Authenticity is in its own a complex concept, which Fornäs (1995) mentions has interpretative perspectives from many recipients of the art. Authenticity is interpreted by the artist as much as by the listener. It is also interpreted by roles outside the chip scene, such as the mainstream media, which has had a tendency of pushing the limits or limiting what can be perceived as chiptune. Polymeropoulou (2014) states the generation of chip musicians ruling around the time of her research were mainly interested in the timbres¹¹ of chiptune more so than the technology and process that made them. Carlsson (2015) states, in his blog posts on what Chiptune is in 2015, that this generation is all about chiptune as *culture*. However, there seems to be a healthy mixture of both emulated chiptune and chiptune written on the original hardware. Furthermore, hardware is still being explored in the chipscene with a desire to push it to its limits. The methodical and process-oriented aesthetics of the scene seem persistent within the newer creative communities to this day such as *Chiptunes = WIN* and *Battle of the Bits*. The first has been noted to have an overabundance of tracks written on Game Boys¹². The latter allows for music distribution with files that can be played directly on the console used to write the music. These have also been noted in the same article by Carlsson.

Fakebit has been proof of concept that chiptune aesthetics go beyond those of technology and process. Perhaps my research will give insight in role nostalgia plays in chiptune, though this is also a complicated concept. I have theorized that there is a division in aesthetics between those seeing chiptune in context of nostalgia and those being dedicated to the in-depth tech-oriented aesthetics.

The issue is mainly that the discourse of hardware and emulation has changed quite a bit over the year, but it seems we have come to a strange point today. Discussions have ceased to occur in the community and are often shut down by comments such as “why bother, enjoy the music”. If so, are we a new generation of chiptune musicians, as opposed to the third generation Polymeropoulou (2014) has described? Then what are our aesthetic values and how did we get here?

¹¹ Timbres of chiptune: In music, the timbre is the sonic quality and shape of a note

¹² The Game Boy is a hand held video game console by Nintendo, first introduced to the market in 1989. It has been followed by several variations such as the Game Boy Color and SP which had more processing power and other upgrades.

1.4 Defining Chiptune Aesthetics

Most people today will find the capacity of these obsolete 8-bit machines laughable compared to more popular and modern tools like Ableton Live and Pro Tools. So why do we choose to write music on them today? It could seem even more absurd that we choose to emulate them with modern tools. There are more than a few reasons for this but there seem to be a set of aesthetics only found in the chipscene that the musician is looking for. Over years of discourse and music release, chiptune has developed and transformed its aesthetics in what Carlsson describes as an “interplay between technology and culture where maximisation was often omnipresent” (Carlsson 2010, p. 13). There is aesthetic value in pushing the limits of the chiptune hardware and the way it affects the musical content.

Simplification of the chiptune aesthetic seem to have resulted in distinguishing between important properties of the chiptune phenomenon. To distinguish between the forms chiptune aesthetic can take, Carlsson (2008) sees three different aspects of the phenomenon. He distinguishes between chiptune as *form*, *medium* and *culture*. Today, these aspects all seem to make the artwork authentic to the chipscene. The form is the musical aspect with recurring compositional and timbral elements. Limitations of the hardware affect and influence these. Chiptune as *medium* describes the methods and process of making chiptune music. The limitations are found within the medium. Chiptune as *culture* is the ideological discourse, community, fashion and personality traits that colors the community. There has been a lot of change in chiptune as culture throughout its history. This thesis aims to define whether or not emulation is part of the chiptune medium to conclude the discourse on authenticity that Polymeropoulou (2014) has researched. This can be found through researching the culture. By doing this we will also find common aesthetic in the form between emulated and hardware chiptune.

Defining the aesthetics of a piece of music is defining the criticism and discourse surrounding it. Monroe Beardsley, whom wrote many articles on the nature of aesthetics, describes it this way and adds that if there is no discussion surrounding a work of art, there are no aesthetics to that work (Wreen 2014). As I interpret his definition I understand that the chiptune aesthetics are found in communication in the chipscene. It is defined by constructive criticism given in the comment sections of a song or what compliments are given about the work of an artist. *Work of art* as a term was avoided in earlier days of academia but with the works of Beardsley it can be defined in the context of aesthetics. In his definition, art is “either an arrangement of

conditions intended to be capable of affording an experience with marked aesthetic character or (incidentally) an arrangement belonging to a class or type of arrangements that is typically intended to have this capacity” (Beardsley 1970). Aesthetics are often used to tell what music could be considered *good*, but art does not necessarily have to be good. As he suggests that the aesthetic is created in criticism of the art he identifies three different forms of critical statements: descriptive, interpretative, and evaluative (Wreen 2014).

Descriptive comments are on the non-normative properties of the piece and will mostly be subject to debate when a piece creates uncertainty on what platform it was written on. The interest of descriptive critical statements appears to me to be less frequent once it is clear the music is not made on obsolete hardware. However descriptive statements on process are commonly found in comment sections on media repositories¹³ and social media¹⁴. The chiptune community is highly motivated by constructive criticism where the listener states what properties of the piece they like or dislike. They are often made in regard to the process, providing solutions to what the listener perceives as faults with the track.

Interpretative statements however, are used to discuss the meaning of the art. In chiptune, it seems interpretative statements that discuss the *message* of the music have been less common up until the last few years. However, some tracks make stronger statements than others. Since the different artists are influenced by different musical backgrounds there might not always be much to interpret. It is also a genre of mostly instrumental music, leaving out the interpretation of lyrical content. Discussions regarding what the author wanted to achieve with the track can however still be found. The message of a chiptune track can be tech-oriented, for instance wanting to explore and demonstrate new methods in the format or utilize new hardware combinations and limiting circumstances. Chiptune artists seem to like challenging themselves, which makes way for a lot of interpretative statements. Examples like “this track uses only the wave and noise channel on my Gameboy” are common. Interpretative statements are in regard to why the artist chose to do so. It could be interpreted in as criticism of other methods, perhaps being fed up with recurring sounds or a maximalist tendency in the chipscene. Perhaps the artist has a nostalgic relationship to the machine and limits themselves within whatever the nostalgia applies to. Even more common is perhaps virtuosity, expressing special skill and knowledge of the format. This is what I usually term

¹³ The Media Repository: A database of digital content. It has been an important format of distributing chiptune music since the first chiptune related repository Micromusic.net opened in 1999.

¹⁴ The discourse today is often present on Facebook. In shared posts by personal profiles or contained within Facebook groups.

tech-oriented. Sometimes a chiptune song could be a response to forum posts (Nisperos 2012). For instance, Chibi Tech, a highly respected Japanese Chiptune musician mainly writing music on the Nintendo Entertainment System, made the track *Moe Moe Kyunstep* to settle a discussion and prove her point in a creative fashion. This following citation is taken from her description of the piece.

“This originally was the result of a rather heated debate with a friend that despite all of its limited audio features... an 8-bit NES can truly make bass-heavy growls without the need of samples.”

I initially saw the last form of aesthetics, the evaluative form, in the context of Carlsson’s *Chipmusic as Culture*. Evaluative statements are either positive or negative, depending on what the listener considers *good* or *bad* chiptune. Positive evaluation of music thrives in the comment sections, chat rooms and forums and seems to both bond the community together or split in. I have had a very hard time finding negative evaluation of music, but this might be due to the public access to online communication. If someone expresses negativity of a chiptune piece, they may be opposed by more encouraging evaluations. Positive and encouraging comments are by far the most common, next to constructive criticism. Negative evaluations seemed more common from those with strong purist ideologies, sometimes even being labeled as elitist.

1.5 Literature

There is a lot of research on chiptune that aims to be descriptive. This thesis is going to research a more internal problem, but the descriptive papers of Anders Carlsson and Sebastian Tomczak are of high importance to stay within the boundaries of academia. I find some of their statements to be arguable at times, but the amount of work they have put into the defining the history and aesthetic is invaluable. In particular, the academic work and reflections of Anders Carlsson has provided a set of tools that will be used to a large degree in this thesis. Though some of it is not edited or published as academic material, I see it as some of the most important groundwork done to make chiptune available for research. It is a phenomenon that is still new and largely undocumented in the world of academia. This thesis will use his research and my own reflections to expand upon the concept of chiptune generations. Most importantly I believe the current Chiptune community has been misunderstood by academia due to misinformation from mainstream media. I wish to

historically place these situations and see how it has affected the chipscene leading up to the current community.

Carlsson wrote his thesis “Power Users and Retro Puppets” in 2010, a time in which chiptune was in a transition phase (Carlsson 2015). Throughout my research I find the thesis to be a great resource for definitions and reflections on the genre’s aesthetics. On a tour to Russia I was in talks with the chiptune pioneer Timothy Lamb, also known as Trash80, whom directed me to Chipflip.com, a blog still being updated by Carlsson. On this blog he often reflects on the history and current state of chipmusic. He mentions historical events and concepts I had little knowledge of. His posts give a useful perspective on the genre from a long-time artist and ambassador of chiptune in academia. At the same time, he expresses a certain distance from the current chipscene and rarely mentions the new communities. He has also noted less knowledge of the 2008-2010 period. I wish to bridge the gap between Carlsson’s perspective and the new community with this thesis. To do so, I will often cite his work and apply his perspective.

When discussing authenticity in Chiptune it is important to distinguish between authenticity as a personal experience gained from a musical performance from the discourse of authenticity. Weisethaunet and Lindberg (2010) argues “There exists a rich documentation of music fans bearing witness to the pleasure they experience when they feel addressed by a performer, or “recognize themselves” in a song. But an even deeper source of pleasure seems to be the feeling that the performer has been able to look into one’s heart and has found the means to communicate who one really is” (Weisethaunet and Lindberg 2010, p. 477). This is authenticity as a personal musical experience, but in chipmusic it does not necessarily describe what the individual listener considers *authentic chiptune*. A natural way to define what authentic chiptune is and what it is not would be to point process-oriented elements that trigger this kind of response in the different generations. I will use the term authentic chiptune strictly to describe what applies to the discourse between the purist ideology and those open to emulation.

Polymeropoulou (2014) provided me with the concept of chiptune generations. She divides the community members based on the ideologies common in the time period the members entered the scene. Polymeropoulou explains, “The chipscene is nuanced by several competing and contradictory discourses” and follows “These discourses primarily embody chipmusic ideology i.e. what is chipmusic and how it should be composed”. The years following the

release of her dissertation it is become clear that the current state of chiptune is much more complex. I simply do not find the characteristics she has used to define the third generation apply to the current community. Even though they are historically juxtapositioned and the influence from the demoscene still inhabits the sound, the aesthetics and ideology of a first generation chipmusician has few resemblances to the second or third generation. Polymeropoulou distinguishes between these generations by calling them the *Purist*, the *Artist* and the *Chipster*. It is unclear what years they refer to however, but this may not be relevant due to the constant transformation of the chipscene. The interest for the documenting these generations are simply found in how they interact with each other. I do, however, see an estimate in when these generations had their heydays. The time period of the purist would be from the late 80's and up until the 21st century. The artist came with the popularity of Game Boy music in the 2000's. The "Chipster" gradually increased in numbers in parallel with the users of 8bitcollective from 2005. I believe the generation I am documenting joined the scene at the end of 8bitcollective's heydays or after, around 2011 and until present day.

1.6 My Role in Chiptune

Since 2010 I have contributed to the genre by releasing a number of chiptune albums next to travelling the USA, Russia and western Europe to experience the chiptune scene and its qualities. I believe it is a phenomenon that deserves to be acknowledged for its unique relationship to culture and technology. It is also impressive to me how the phenomenon creates unlikely bonds in celebration of this culture. Some research also claims it is a unique example of the emotional power of nostalgia. That was certainly the initial motivation for me joining the scene.

I have been persistent in exploring the discourse and culture of the phenomenon since 2010, yet I have rarely contributed to it other than through music. In my hometown, Sandnes, there were no real-life communities for chiptune music as far as I knew. In a sense, I was very disconnected from the chipscene with little chance of experiencing it in real life. However, on the internet I could create a name for myself as well as gaining new friends all over the world. Intrigued by footage from chiptune events like Blipfest, Eindbaas and street performances through documentaries and pictures from all over the world, the community had left quite the impression. I have heard a lot of similar stories from other artists that entered the scene around the same period. From my point of view, I have remained mainly an observer of the

internal discourse until recent years. This way I am confident I'm in a position to research it without too much bias though it leaves out a certain impression of what the real-life communication between chipmusicians might have been.

I acknowledge that my work will mainly be my interpretation and reflection on the subject, unable to cover all aspects. Describing my role in the chipscene is of great importance to gaining the right impression of this thesis. The research will create knowledge I believe to be important, but it needs to be seen in context of other academic work. My reflections on previous research will be just as unique as that of any other chiptune musician. Some points will be more agreeable for the majority of the community than others. My background will certainly affect my reflections. Subjectivity and personal bias is simply unavoidable in my research.

It is important to understand my methods of writing chiptune to understand my interpretation of these issues and the data I collect. I mainly use non-obsolete hardware and emulations, but lately have started applying the Game Boy to my music. When I started writing chiptune music I was already appropriating software that was not meant for production and really enjoyed making the most out of limited gear. I had written well over a hundred songs on Guitar Pro 5¹⁵ prior to my discovery of chiptune music, but the conversion quickly made sense. Guitar Pro was a notation software I used to write music for imaginary bands. Funny enough, I used certain techniques that would make the software sound more powerful. I would start releasing my first tracks on 8bitcollective in 2010 and entered the scene with a liberal, but, in a sense, ignorant view on chiptune. For a long time, I was unfamiliar with the history and the connection to the *demoscene*¹⁶. The purist would most likely not call me an authentic chip musician. However, I believed my authenticity was found in my interest in chip music. My fascination for writing music with the most basic electronic wave forms¹⁷ in a world ruled by complex sound synthesis, multi-tracking, layering and perfectionism was reason enough for me. At the time I did not believe I could create music of such quality, but chiptune seemed within reach. In chiptune I found rawness, aesthetics and, most importantly, a community that made me feel good about the music I produced. I know within myself the biggest reason for me submitting music to the scene was the knowledge that someone listened to it and sometimes even commented on it. The critical feedback I received from strangers

¹⁵ Guitar Pro 5 was released in 2000 and was often used to learn songs for guitar through tablature notation. It could also be used to compose music utilizing the internal MIDI sounds of the computer.

¹⁶ Demoscene: This hobbyist programming culture that is directly linked to chiptune music will be explained in my discussion of the Purist

¹⁷ The wave form is the shape of an electronically generated tone, with examples such as Square wave and Saw wave

turned the members of the community into role models and a drive to impress them through my compositions kept me interested.

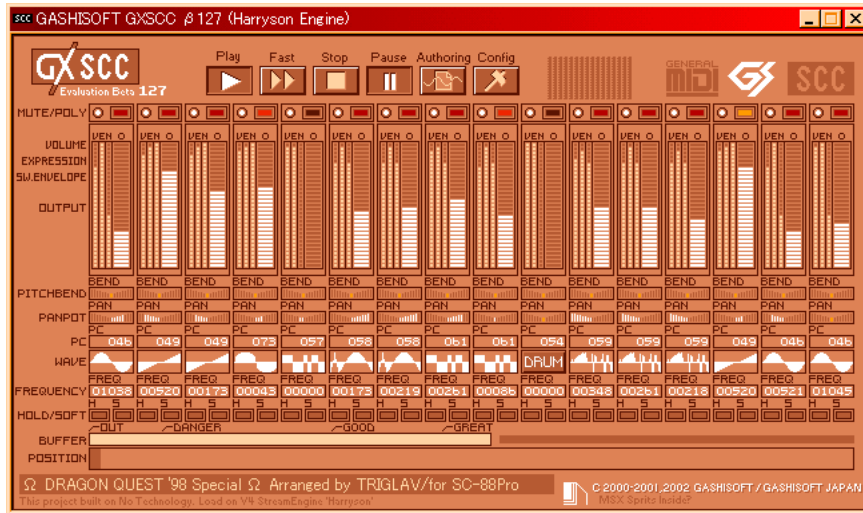
Research into the history of chiptune has been conducted on several occasions as listed above. However, researchers seem to always weigh differently certain aspects of the scene. Some are focused on the hardware and some research it through ethnographic methods. But even in qualitative research aiming to be neutral and objective, it seems like the parts of the chipscene that is closest to the researcher is the most important aspects used to describe it. It seems most researches, myself alike, would like to grasp chiptune in its entirety but still define the values of the scene from a point of view common to their generation. Therefore, I believe in a quantity of reflections. I will reflect using own experience, impressions and understanding of chiptune as a practitioner of the music and culture.

If we only believe in the three generations defined by Polymeropoulou (2014) I would consider myself a chipster. Not only because of the period I joined the scene, but because I was originally interested in the timbres and culture of chiptune. However, this has changed a lot over the years and the tech-oriented aspect has influenced me greatly in composition and ideology. My ideology was also liberal in terms of emulation and obsolete hardware. In the words of Carlsson (2010), “The fascination of chipmusic often comes from an idea that the media were not intended to be used for making music”. This was certainly the case for me and many other users in the scene around the time Carlsson released his thesis, but I believed it was more than that. I was very motivated by the sense of community. I would argue that if it is created by the chiptune community, it is chiptune, regardless of sounds or hardware used. It seemed to me like if you were involved with the chipscene, interested in the style and understood why people were creating this, you were already an authentic chipmusician.

I wrote my first chiptune songs in Guitar Pro 5 and converted the midi files into audio through a free software called GXSCC. It was in no way a respected tool in the scene at the time, mostly because its most common use was to convert the midi file of a famous song into a very quick chiptune-mimicking sound and upload it to Youtube with a title suffix of “Chiptune Cover”. This phenomenon was often subject to criticism in the forums at the time so I quickly converted to learning a music tracker¹⁸. The sound of GXSCC was easily recognizable for those with informed ears. Certainly, there was no doubt I used it, but the comments I received

¹⁸ A music tracker was a type of music software that was first used for creating music on the computer. As opposed to today’s horizontally moving timeline, the music tracker is characterized for playing vertically. Today there are many variations of the Tracker software available for most computers, mostly developed by independent software developers.

were rather positive to my own surprise. In retrospect, I theorize that my authenticity was perhaps represented through musical content. The biggest difference of my use of GXSCC from the more criticized uses were that I had written the compositions myself entirely in Guitar Pro 5 before running it through GXSCC. I have also theorized that perhaps I released this music during a de-escalation of criticism towards the software.



Figur 2. The user interface of GXSCC (GASHISOFT)

Fast forward to 2017, I had released a number of albums using several different modern music trackers and DAWs. I gained recognition from the scene in a larger scale, as well as outside the chipscene. My album *Ember* saw commercial success and I was given the opportunity to travel to America and around EU and Russia to finally see the chiptune community in action. It was surely a dream come true to perform and celebrate with the chipscene and discuss the culture in person. Meeting my role models, experiencing what the scene was *all about*, as some would say. At the time, continents seemed connected by the knowledge and admiration of the artists on either side. This is still the case and allows for artists to travel the world to meet friends they never before have seen in real life.

The purist may have disagreed with my methods or more so the fact that I called it chiptune. This is quite understandable considering the scarce knowledge I had on the background of the scene. It was out of my league to pay tribute to early chiptune performers and I did not feel like their aesthetic resonated with my interests. To me, this thesis is to make up for previous ignorance and supply academia with knowledge I believe is so far untouched.

1.7 Hypothesis

Polymeropoulou (2014) describes the last generation of chiptune musicians as practitioners of hipness, mostly interested in the timbre of the sound chip and allows it to be used in the context of other sounds and methods. Looking at the chiptune community today I see little coherence with the hipness culture described with trolling and unconventional beliefs. It seems to me like there exists a new generation of chipmusicians that do no longer interest themselves in the hipness she emphasizes. I have gained an impression that the subject of authenticity is no longer of importance, which has also been reflected upon by Carlsson (2015). If Polymeropoulou's generation is defined by the discourse of Authenticity, can we apply this to a fourth generation? Furthermore, if there are aesthetics and historical events that apply to the generations, can we define a fourth generation by aesthetics and historical events?

2 METHODOLOGY AND THEORY

Kvale (1996, p. 83) notes the nature of qualitative research with “surprises, design changes, and reformulations of concepts with hypotheses”. My research plans have, without a doubt, gone through many transformations. It was difficult to decide which subject I could contribute the most to in academia. It was also quite challenging to realize time and time again that I had been wrong in assuming something and having to start over. In the beginning, I was only certain I would write about chiptune music in some sense. I wanted to use my knowledge in the best possible way next to learning new perspectives. First, my goal was to strictly describe techniques that we can use in Fakebit in order to make it more authentic chiptune. After a while, I realized the complexity of authentic chiptune. When trying to gain an understanding of this, I realized the misunderstanding and lack of perspectives presented about my community today. It also shifted into describing the role of nostalgia before transitioning into placing my knowledge and data within the context of Polymeropoulou’s generations. Fortunately, the knowledge I have collected from these other approaches apply to this issue. But I digress, it is a part of the research process. Methods and structure had to be changed on many occasions. Quantity was therefore an issue in the end.

There was certainly quantity in the amount of knowledge I had consumed in the many academic articles, real life connections and online fieldwork, but the methods to test my hypotheses will not necessarily prove anything. However, it seems more important to discover what parts of the issue will need quantitative research later on by utilizing qualitative research methods. Later on, researchers can see my thesis as a contribution to the subject with quantitative interviews and field research to decide the importance of my claims. I still believe my thesis is important, even though parts may seem premature to the well-versed researcher. These perspectives simply have not been represented in academia. Research on chiptune is still in a phase where we need to collect more perspectives and document the many aspects of the scene. Through qualitative research we can discover new theories, as opposed to confirming existing theories or collecting statistics. I have selected my methods based on this belief.

2.1 Interviews

It is important to test my theories within accepted methods of qualitative research. It is also important to gain new perspectives on the matter at hand to clarify the purpose of the research

(Kvale 1996, p. 95). Interviews have been an important method within modern science, both as qualitative and quantitative research. Kvale (1996) notes the requirement of quantitative scientific knowledge in modern science and the heated topic of qualitative versus quantitative methods. I understand the need for quantity to validate and legitimize data as statistic or even scientific. I will however conduct fewer interviews with influential and knowledgeable figures. I find that it is very important for the interview to serve a specific purpose, especially in qualitative research. By analyzing the interviews, I can gain an understanding about certain issues through dialogue. My interview analysis will use what Kvale (1996) describes as *Ad Hoc Meaning generation* instead of condensing my analysis to one of his methods. Kvale explains “There is instead a free interplay of techniques during the analysis. Thus the researcher may read the interviews through and get an overall impression, then go back to specific passages...” (Kvale 1996, p. 204). The interviews are therefore not central to collecting data or included cited in a large scale, however they will add to my reflections of academic material and online research. The interviewee will also supply me with directions when needed, for example in explaining how to perform a technique on the Game Boy.

The purpose of my interviews is to present my issues to two people knowledgeable of the subject. One who strictly writes chiptune on obsolete hardware and one who strictly emulates chiptune with modern production tools. I wish to understand their point of view on the issue of authentic chiptune by asking them questions relevant to the work of Polymeropoulou (2014). I do also wish to create an open conversation to perhaps gain new perspectives on the issue. Their emotion and relationship to the issue could be of importance but it is of greater importance that I understand their thoughts and opinions on it. Therefore, I have decided to conduct two semi-structured interviews by text, utilizing social media chat functions.

After studying the issues through my other methods, I have tested my data with two subjects using semi-structured interviews. I believe two interviews is enough to gain necessary data. This is because the subjects already have in depth knowledge of the different ideologies of chiptune and will give in depth perspectives on the discourse. It is also because the response from all artists would be very unique and it is therefore important to see it in context of their background. I decided it was more useful to go in depth on the perspectives of these artists as opposed to generate a lot of data on specific set of questions. They understand the issue and can provide in depth reflection. If I were to conduct many interviews it would rather be to map out coherence between many artists. This could be useful for quantitative research, but

because of the shifts in my research aim and the limited amount of time available it was not an option. In my thesis the interviews rather play a role of gaining new, well reflected perspectives on my issues. I decided to ask questions that reveals what generation the interviewee may belong to and if they agree with the data Polymeropoulou presents. I have used the following questions as a foundation for the interview structure:

When did you discover the chipscene?

Can you recall what motivated you to writing the music?

Who would you say are the original chiptune artists?

Do you see trolling and hippness as an important feature of the chipscene?

What does authentic chiptune mean to you?

To what extent are you aware of the more advanced aspects of hardware programming?

The conversations my research is based on have varied in structure, from spontaneous to semi-structured. I will however only cite the interviews that have been structured with a clear purpose and composition of questions. It is important to note that a portion of my knowledge comes from many undocumented conversations I have had with chipmusicians. Luckily, some of them took place on Facebook Messenger and other online communication tools. Therefore, I can go back and analyze the conversation to make sure I had the right understanding of their perspective.

I have suggested direct citations with names instead of citing them anonymously. This is because their background is of great importance to what role their views play in my thesis. Since I wanted my interviews to work as a conversation with the purpose of gaining understanding in how such a conversation would go about, there were certain parts of analyzes that were neglected. I did not always get the chance be interpretative of their answer, which Kvale (1996) states as one of the *six steps of interview analysis*. However, it was completely possible for the subject to edit or remove his messages. Kvale (1996) notes the importance of allowing the interview subject to speak freely and being able to correct one's messages is part of speaking freely with this communication platforms. Since it is a written interview using direct messages, the subject could spend as much time as needed on his reply and in some cases, they would ask me not to quote me on certain things. This is something I naturally agreed on.

In these interviews, I decided to play the role of an equal artist, rather than a researcher. There are several reasons for this, one being that they may have built a certain relationship to me as an artist rendering me unable to play a neutral role. It has also been my impression that, if done right, this way makes the interviewer more enthusiastic about the theme and perhaps more open. It removes the feeling of having to explain things to someone that might not have an understanding of chiptune. Kvale (1996) also notes the importance of shared enthusiasm of the subject at hand. A recurring issue of my interviews was in whether or not to express my bias. It is of great ethical importance to not put words into their mouth, so to say. If I were to do interpretative responses during the interview, this could quickly become the case if I was also to play the role of an artist.

It was important for me to make the interview feel comfortable as a conversation to allow for him to express his beliefs. Often by agreeing or disagreeing with statements given to me by the subject, I could present new issues or questions by stating my point of view. They were already familiar with my work and could perhaps even see it in the context of my role in the chipscene. Even though it supports enthusiasm, this was also an issue and I acknowledge that their impression of me might influence whatever opinion they decide to express. It was therefore important for me to express interest in *their* perspective as opposed to only testing my data. It was also interesting to know more about their background in the scene in the start of the interview.

The fact that the subject gets all the time he needs to properly formulate and double check his reply before clicking send can be both beneficial and leave out certain elements for meaning interpretation. I came to the conclusion that the approach mostly benefitted my research since I wanted the subject to give me information that they would not wish they would have explained differently later on. Letting the subject formulate his response properly allows for him to speak his mind without being heavily influenced by the element of situational stress in an interview. This may still play a role, but letting my subject take his time is definitely beneficial to gaining an accurate description of the subject's point of view.

During my research, I have conducted two semi-structured interviews with a goal to test data collected so far as well as gaining new perspectives on the subject. One has been conducted in the private messaging function of the social media website Twitter and one through the private messaging function of the Discord application. They have mostly the same features of being able to edit your messages after they are sent as well as notifying the user when the

other user is typing. This has been useful to avoid interrupting the subject. Even though the interviews were semi-structured, they could often, in a sense, spiral out of control. The enthusiasm for certain themes could naturally lead into a new theme. I therefore prepared my interviews to have a few mandatory questions and themes that the conversation would touch on as shown above. When the interview was conducted I let the conversation be controlled by the subject as it would manifest how the subject connected certain concepts. For instance, when asking what the subject would define as authentic chiptune the conversation could lead into whatever is important for the subject, be it the community or the writing process. While reading the replies I could place them within the interview structure for analysis.

I wanted to interview one subject that was deeply knowledgeable on the tech-aspect of LSDJ music and one figure that was in the world of recreating the aesthetic on modern software. The first, Paul Aupetitgendre of Pain Perdu has, alongside Maxime Roulleaux, made waves in late chipmusic with their duo format LSDJ project. Since entering the scene in 2011, Paul established himself quickly as an artist with unique technical mastery of Game Boy music. Using only one Game Boy Advance SP, Paul and Roulleaux create music utilizing many techniques and composition strategies that benefit them in the process. I met the duo in Paris in May 2016 where we talked about Game Boy music for a while. I knew them from the Chiptunes = Win community since they had been very active in the forums and groups. Ever since hearing their work, I found them to be particularly good examples of the new tech-oriented chiptune approach. Paul had contributed to the scene with many articles and ideas next to the impressive music releases that gained them well deserved acknowledgement, both in the online community and real life after performing on Eindbaas and Square Sounds Tokyo.

For the second subject, I spent a lot of time thinking about who I'd use. I wanted someone who was active and had roots going far back in the history of Chiptune. I wanted to know their views on the discourse of authenticity as described by Polymeropoulou (2014). I knew it could be a touchy theme for either, but I wanted someone who had been involved in the discussion and formed a clear opinion. After being contacted by Tobias Gärder for a remix request I understood that he could be an excellent subject for interview. He had been involved with making chiptune since being introduced to the demoscene around 1991 and currently makes Chiptune music using the popular DAW *Ableton Live*. This would provide a good understanding of the issue. I was less familiar with his background, but it turned out to stretch

back to the early 90's which was perfect. He had many thoughts on the subjects and was well reflected.

2.2 Personal Practice

During my research, I learned many new techniques that are common practice on the Game Boy. It has always been an important part of my personal endeavors to translate aesthetics of chiptune music to modern software. In 2014, I obtained my first Game Boy DMG-01, the original Game Boy model. From there, I spent hours upon hours trying to grasp the LSDJ music sequencer and started discovering the almost exclusive aesthetics of its music. The limiting circumstances for music production within the console is common knowledge in the chipscene and the aesthetics revolve around pushing it to its limits. The aesthetic is, simply put, tech-oriented. To create your own sound in a format that usually does not have much varying sound qualities and flexibility requires innovation at a large scale. Sound design within therefore makes up for a lot of its musical aesthetics. Since then I have incorporated what I have learned from using LSDJ into making music on my computer, as well as in mixing and sound design on synthesizers. This practice is what gave me the interest in the subject of *authentic chiptune*. I wanted to learn if the techniques I used would make my music more so. A lot of research went into asking well versed Game Boy musicians questions regarding these techniques and in-depth explanations. During travels around Europe and USA, artists would also teach me their methods. A little too late I realized that *authentic chiptune* as a concept was too complex and many-sided. On request from my mentors, my research pivoted towards building upon the work of Polymeropoulou (2014) instead. Authenticity was a dangerous word to use without being familiar with the many articles written on the subject to a large degree, but the meaning of authentic chiptune was more focused and simple for me to grasp. It first seemed easily explained as the relationship between obsolete hardware and emulation perceived by the three different ideologies. Yet, I noticed the subject had undergone had evolved into something different today. The discourse was not the same. I believe my personal practice had given me a valuable perspective on the subject, perhaps one that could be used to define where the discourse concluded.

I will demonstrate relevant parts of my personal practice in this thesis by showing how to translate an aesthetic deriving from LSDJ to Renoise, my DAW of choice. The next chapter will explain the limitations and features of these two programs.

2.3 Hardware and Software

2.3.1 LSDJ

The most important hardware to chiptune seems to be the Game Boy. It was accessible and cheaper than the other obsolete machines used. Even though it was not used as much by first generation chiptuners, it is possibly the most influential console. Most discourse in the scene revolves around it. Not only because it was the hardware of choice with a high skill ceiling but because the discourse of authenticity often revolved around it. This chapter will explain the process and limitations it presents. It will also look into my modern software of choice. Renoise, a music tracker for Windows, Mac OS and Linux, is a popular DAW for creating chiptune music.

A Game Boy has four channels that can play simultaneously, similar to a synthesizer with 4 sound sources or oscillators. Two of the channels produce the sound of a square wave with four different pulse widths. The different pulse widths have their own recognizable sonic character with the 50% pulse often being described as round while the 12.5% pulse has a brighter and thinner timbre. The 25% pulse width is somewhere in the middle. The Game Boy's third channel is a wavetable channel able to produce more complex wave-shapes and even play back samples. Typical sounds generated by the wav channel is the triangle wave form. The last channel is a noise channel able to produce a 7-bit semi-tonal noise or a 15-bit white noise, both with some options for pitch. I call the 7-bit noise semi-tonal cause its pitch is strictly limited to, more or less out of tune D, C, F and A-flat tones. This is because the way the noise is pitched is due to division of the noise frequency, meaning it will start on a bright C and then divide by 1 through 7 as it is pitched down (Collins-Dowden 2016). Its raw and harsh timbre also makes it a rare choice for melodic content. These sound generators are all part of the 8-bit CPU chip found in Gameboys, for example the Sharp LR35902 that was used in the original Game Boy DMG-01 from 1989. I will mainly focus on the DMG-01 since it has been the Game Boy of choice for most chiptune artists. There are many comparisons of the sonic difference between the different versions. The DMG-01 has the least processing power of the options but is often said to have better bass response and more dynamic audio output. Comparison between the different consoles can be found in many forums and blogs like the Aquellex technical blog (Mon 2018).

Another variable that affects the sound of a Game Boy is the modifications done to it. Due to its high noise floor on the original headphones output it became normal to open up and solder new audio outputs. Other modifications could be backlighting the screen to make it possible to read in the darkness of a live show. Modifications of the console a part of hacker culture that will be explained later, but I will not go in depth on these modifications and their role in the culture.

In my research, I will mainly cover one of the most popular softwares used for creating chiptunes. Little Sound DJ – commonly called LSDJ – is a Tracker software for the Nintendo Game Boy created by Johan Kotlinski. It was introduced in 2000 and is still being updated as I write this thesis. New features are being developed and it is currently considered one of the most powerful tools for creating hardware chipmusic. LSDJ utilizes can utilize the 4 audiochannels of the. LSDJ utilizes 4 layers of sequence-looping. The fundamental one is the “Phrase” screen (Figure 3), in which notes, instrument changes and effect commands can be inputted to create a loop.



Figure 3. Gameboy phrase screen.

This loop sequence can however only contain 16 steps. In the “chain” screen these loops can be arranged into a chain of phrases (Figure 4).

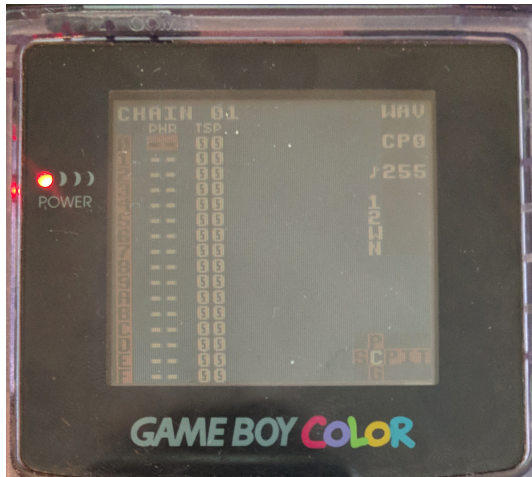


Figure 4. Gameboy chain screen.

Chains can consist of a maximum of 16 phrases and can be placed around in the song screen on any of the 4 audio channels (Figure 5).



Figure 5. Gameboy song screen.

There is also another microlooping tool available to be assigned to instruments called Tables. This gives access to volume changes, pitch changes and two lines of effect commands. The Tables screen is very important to creating depth and details to the instruments. It is also a great utility for creating for example arpeggios, looping sequences or creating kick drums.

LSDJ is considered a music tracker because of the way the timeline is illustrated vertically as opposed to horizontally, which is more common on modern DAWs like Pro-Tools and Cubase. Music trackers were the first computer programs for making music on and is the most common composing tool for chipmusic. A lot of techniques used in programming chip music therefore derives from the music tracker and often utilizes its effect commands. Today, music trackers are found on all sorts of computers and consoles. Famitracker for the PC,

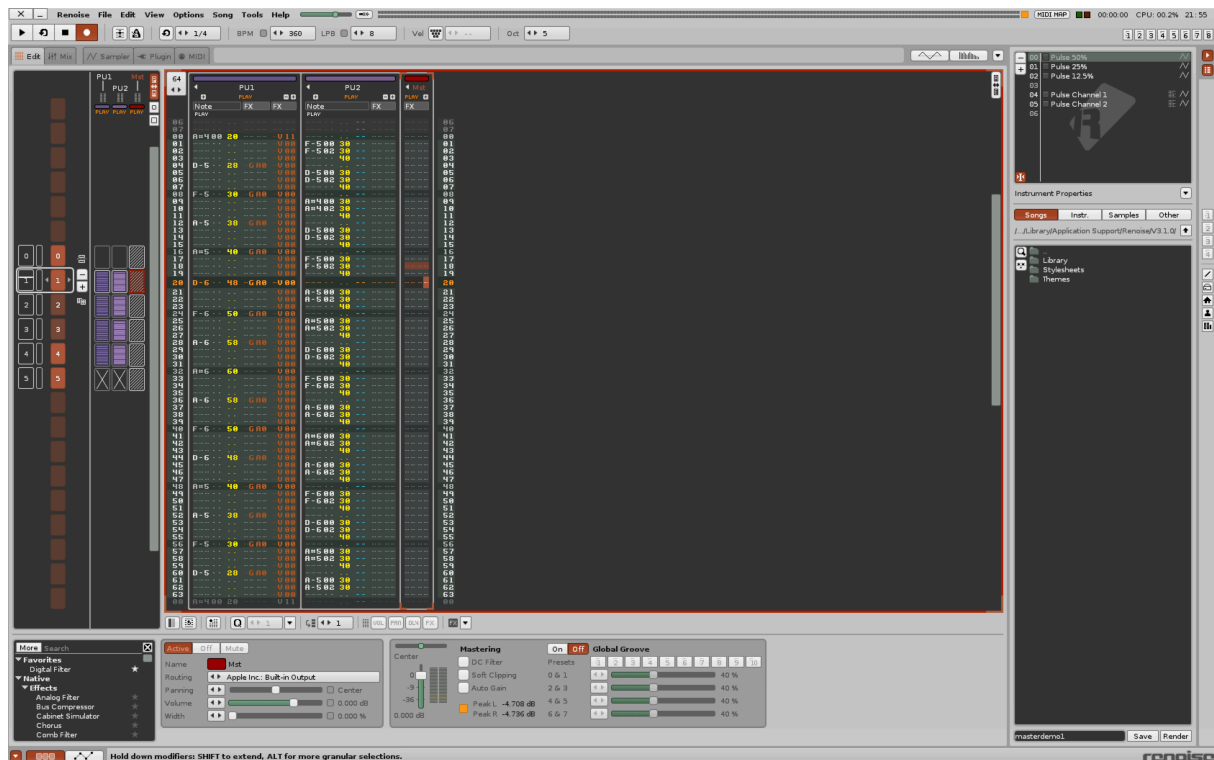
maxYMiser for the Atari ST and HoustonTracker for the Texas Instruments TI-82 calculator are other examples.

In LSDJ, there are different units of speed represented. This is relevant to understanding how many of these techniques are designed and how it is affected by them. Musical note lengths are typically related to steps, which are the vertical lines of the sequence screen. However, you can control the value of a step through the Groove menu and by changing the tempo in the Project screen. The groove menu gives control over the second unit which is “Ticks”. Johan Kotlinski describes Ticks in the LSDJ manual, “To understand the groove concept, you need to know that the sequencer’s time handling is based on an abstract time period called tick. The length of a tick varies with the song tempo but is typically around 1/60th of a second” (Kotlinski 2017, p. 25-26).

The LSDJ user manual should be used to understanding the many functionalities of LSDJ, for instance the many Effect Commands. This is also subject to change and there have been many updates to several aspects of LSDJ, especially the effect commands, throughout the times. I will use lsdj version 4.9.5 for demonstration. This is mostly because it is the version used by Pain Perdu whom supplied me with song files for this research. I will also be using LSDJ on an original Game Boy DMG-01 with RCA pro-sound mod or a Game Boy Color with no modifications, as opposed to a Game Boy emulator. This way I will be able to test techniques with the original CPU chip with same processing power as used originally.

2.3.2 Renoise

Renoise is a music tracker with DAW functionality. It has been my DAW of choice for writing electronic music since 2011 and gives me an interface that is similar to the one used on obsolete hardware. However, it can run VST plugins and has a set of audio effects built in, but when adapting techniques from LSDJ to Renoise I will not use these. Renoise can also play back and record new samples. For further information on the functionality of Renoise, please refer to its user manual which is available online (Voois 2014).



Figur 6. A screen capture of the song editor of Renoise 3 running on Mac OS

The song editor screen of Renoise is similar to the Phrase editor of LSDJ. It plays vertically with notes inputted on lines that act as a subdivision of a beat. In the figure above, one line $1/8^{\text{th}}$ of a beat in the tempo of 360 beats per minute. I choose to use this program because of my experience with it and its relevance to the history of chiptune music. Music trackers have been the standard for music creation on the obsolete consoles. It may be for aesthetic reasons, but I also find it to be the software that gives the most type of control that allows you to adapt chiptune techniques.

2.4 Analysis of Song Files

My prior knowledge of original chiptune techniques was a good starting point going into researching its aesthetics. At the same time, I acknowledged that I was no expert and could not make a judgement on what techniques are important alone. Perhaps not even by proper sound analysis and transcription. Even with around 100 hours of chiptune programming I'm no expert compared to the pioneers of the LSDJ that I'm, figuratively speaking, surrounded by. LSDJ seems to have a steep logarithmic learning curve. This was at least my conclusion after having previously opened up and analyzed the song files of different chiptune albums

like Applesauce by Twistboy¹⁹. I myself had only touched on LSDJ-composing on a few occasions but enough to know as to what extent it could be technical and challenging. Knowing this and listening to music that sounds directly impossible on a Game Boy proved there was invaluable knowledge to be gained from learning these, maybe even for someone who do not intend to write music on the respective format. All of this still was a clear sign that I needed help on deciding which techniques my thesis needed to cover. I have therefore decided to approach artists and ask for LSDJ song files to analyze.

A recurring theme in chiptune production is that of audio illusions. Perhaps most important of all the illusion of simultaneousness (Aupetitgendre 2018). Illusions will not only show virtuosity through potentially defeating a technological barrier the format may present, it is necessary to produce some of the basic concepts of music composition, for instance, that of harmony.

Dittbrenner²⁰ mentions four typical restrictions with chipmusic platforms. Polyphony (amount of sounds that can be played simultaneously) and timbre (the character of the sound) is part of the soundchip, and two other aspects are external to the soundchip: memory (RAM and storage on floppy disks or cartridges) and external factors (processor speed and frame-rate). (Carlsson 2010)

A recurring theme in the techniques for LSDJ are of creating simultaneousness or the illusion of such. Programming the CPU into tricking the brain, making the listener perceive things that are not necessarily happening. A Gameboy sound chip is, as previously stated, only capable of playing back 4 sounds at a time. In the words of Aupetitgendre (2018) “It is both the constraint and the appeal, if you want to write for chips, you have to consider a very limited workflow, but that aspect of challenge, musical or technical, is also what draws musicians to try it out”. I have used the song files to analyze these techniques.

2.5 Online Fieldwork

Since a lot of information was lost with 8bitcollective and it is an almost impossible task basing my research solely off archived websites, I have decided to go to use other sources. The artists and producers that are willing to share their knowledge are fortunately available and eager to share their thoughts. Using social media services like Twitter and Facebook, as well as communication platforms like Discord and Facebook Messenger I can easily get in

¹⁹ Applesauce by Twistboy: <https://twistboy.bandcamp.com/album/applesauce>

²⁰ Dittbrenner, N. (2007). Soundchip-Musik : Computer- und Videospielemusik von 1977-1994. Osnabrück : Electronic Publishing.

touch with those pushing the genre forward, as well as those who have a history with chip expanding way back to the beginning. Yet it presents a definite element of subjectivity and room for error or disagreement. Therefore, papers and academic material will be important to put these techniques in the context of aesthetics since there is already a lot of it having been defined. However, there is also subjectivity to deciding if something truly is part of chiptune history. I acknowledge this subjectivity in my selection and data I will collect and will actively analyze my sources of information to create as neutral content as possible.

The online field work will mostly be in digging up blog posts and reflections on the subject. The written thoughts on chiptune music and the chipscene that you can find online is very helpful to understand its aesthetics. As mentioned earlier, discussion on the art and phenomenon creates aesthetics. The internet is a research engine with incredible amounts of data. Music reviews and blog posts are a great tool for gaining insight into the values of the chipscene. Even if they are clearly subjective and the writers are biased to some degree, the content I have come across has shown impressive levels of reflection.

Especially important is the blog Chipflip.org curated by Anders Carlsson, as mentioned previously. Not only does it give great tools for researching chiptune such as the concept of the three chiptune forms, it also reviews and discusses academic work by others and reflects on complicated situations in the chipscene.

3 DISCUSSING THE GENERATIONS

3.1 The Purist

Marylou Polymeropoulou (2014) notes the first generation of chipmusicians is directly linked to the demoscene. Anders Carlsson (2008) explains the demoscene as a “community focused around the production and dissemination of audio-visual artefacts generated in real-time”. Mainly on some of the world’s first home computers. Polymeropoulou argues a typical trait of their ideology, as the name she uses suggests, is purism. For them, chipmusic is a result of technology and can only be made on the original hardware. However, Carlsson (2014) has argued against this claiming “There was certainly a romantic ideology of originality at work. But I’m not so sure about ascribing a technological purism to the demoscene of that time. Sure, people loved their machines. But most sceners eventually moved on to new platforms (see Reunanen & Silvast). So, I’m not sure that this generation would be the anti-thesis to fakebit”. In fact, the purism might have been more present in the second and third generation. Regardless, the aesthetic values and culture of the first generation that this chapter will discuss still influence artists today (Carlsson 2015).

3.1.1 Community

The demoscene produced several types of work; demos, diskmags, slideshows, text art, music disks, cractros. These are common names for the artefacts of the demoscene, often showcasing the programming skills of the creators. Many of these would include chiptune music and the musicians were included in the activities of the demoscene. The chiptune musicians of this generation worked very close to the programmers in this scene and often distributed their music through these formats.

It was not until the establishment of micromusic.net that the chiptune phenomenon started to separate itself from the demoscene. Until then, the aesthetic and community walked hand in hand with the *hackers* of the demoscene. Hacking is a term used by the scene when talking about appropriating technology for different use and utilizing unconventional methods for creating media. It is important to note that the demoscene still exists to date and now utilizes both new and obsolete machines to produce art. However, there seems to be little communication between chipmusic and the demoscene. Sometimes there are chiptune side-events at demoscene events, and there are certainly musicians in the demoscene making

chiptune. However, it seems like there are few demoscene musicians contributing to the chipscene today.

Carlsson (2009) notes “Members were predominantly middle class teenage males from OECD-countries, residing mostly in Northern Europe”. In my interview with Gärder (2018) he also mentions they were young, Scandinavian people. Similar to the current chipscene, the demoscene had a sense of community which was established through an interest in the scene itself. Many articles mention the demoscene culture was built up on competitive atmosphere (Carlsson 2009). It was about making the best software using the most impressive methods. Those who could prove they were, as they would term it, elite through showcasing skill in creative programming were the stars of the demoscene. They made a name for themselves through showcasing their group name or alias in the audio-visual work.

The meetups and performance of their work were often called competitions, or *compos*. Communication happened through some of the earliest forms of online communication services such as the *Bulletin Board System*²¹. This server could be accessed via modem to share files and communicate knowledge. It is one of the first cases of global internet communication utilized by the youth. There would also be real life meetups and what Carlsson (2009) calls *copy parties* where members of the demoscene would meet to copy programs and other popular media. They could learn from each other and share the codes they had been working on, as well as evolve their aesthetic values.

“With modems and illegal tricks to use telecommunications, teenagers at remote places could reach fame with their technical efforts in a subculture fenced off from real life identities. They were programmers, composers, and visual artists but also dedicated people that formed the backbone of the social network.”
(Carlsson 2009)

It is noted that the demoscene had a competitive atmosphere. The community had several groups or teams that would work together to create the best software. Incidents of aggressive discussions as well as violence have been reported in the scene and sets a stage for the competitive atmosphere (Carlsson 2009, p. 17). However, Carlsson (2009) also notes “The feeling of community was strengthened when physical meetings started to occur”.

The community of the first generation chipmusician is certainly best described in papers on the demoscene. During my interview with Tobias Gärder he mentions his entry to the scene

²¹ BBS: Bulletin Board Systems were servers that could be connected to via a terminal program and dial-up internet connection.

was connected to the demoscene through a friend at the time. “I wanted to do that stuff too so I'd lug my Atari over to his place and make music while he coded” (Gärder 2018).

3.1.2 Hardware

The different hardware used created their own subgroups within the demoscene, specializing their talent on the machine at hand. This was also the case for the musicians. They would often create their own tracker programs to program their music on. The most mentioned console is the Commodore 64 which used the SID sound chip. This is perhaps one of the most mentioned sound chip in the chipscene to this date. Renowned for its filter and characteristic sound generators it is highly recognizable for informed ears.

When the Amiga was introduced many Commodore64 users would naturally be interested in this machine as well. This computer utilized samples as opposed to the sound chip. Ironically enough, on this machine we find what some to believe the term *Chip music* was first used in a music disk by 4mat, release 1989 (Carlsson 2017).

The main home-computing competitor to the Amiga was the Atari ST. Reunanen and Silvast (2009) notes that the Atari sustained a demoscene of its own. As the personal computer by IBM started appearing in households the market competition started to fade, and the sound chip was running out of fashion. However, the creative appeal to making music on the sound chip sustained chipmusic in the demoscene.

3.1.3 Practice

This generation sees chipmusic as anything made with sound chips. The SID chip of the Commodore64 and the Yamaha YM2149F sound chip for the Atari ST were commonly used in the demoscene. The early day chipmusicians did not only write the music, but often wrote the software used for composition as well. However, it is noted that mimicking the sound of popular music at the time was popular. Some of the musicians were programmers more than composers and could sometimes copy or remix the compositions of others. However, copying was an important part of the culture.

The first chipmusicians were those that made music in the demoscene. The community was mainly interested in free use philosophies. They supplied music to cracktros, linking them to early day piracy (Reunanen and Silvast 2009, p. 294). The demoscene is described to be

motivated by a sense of rebellion and will to illegally copy copyrighted work by cracking software. *Cracking* means removing parts of a software – typically a video game – that protected it from copying. *Cracktros* – a term combining the word *crack* and *intro* – were programs that would run at the startup of the cracked software, showing off the programming skills of the cracker. It would feature visual artefacts with the alias the cracker may use as well as a chiptune to compliment it. Even though copying was the main motivation of the demoscene, originality and ownership was important to the cracker (Carlsson 2009).

With the rise of the online media repository micromusic.net, the chipmusician could be separated into its own art form, independent from the demoscene. However, the music uploaded here would have to be approved by the moderators of the website. This became a subject of discussion in the forums where artists expressed discontent with the approval required before the songs being published.

3.1.4 Aesthetics

The aesthetic of the demoscene is often within utilizing uncommon programming techniques to make visuals and audio and transgression in programming. These are often characterized as *hacker aesthetics*. The goal was to show technical virtuosity by making software that was not supposed to be possible on the machine at hand. Carlsson (2009, p. 16) explains the demoscene was “demonstrating how to maximize specific hardware through unorthodox programming”. This also influenced the early chipmusic artists that made the music for the demoscene. The hacker aesthetic has remained in chipmusic even to this day, the interest to push the hardware to its limit and use it with unorthodox methods. (Houston 2016)

Hackers explore the machine in artistic ways. They can be coders, musicians, designers — whatever. They are not necessarily experts, but they know how to transgress the materiality/meaning of the hardware/software. They can make things that have never been done before with a particular machine, or something that was not expected from it. That often requires not-so-rational methods, which is not always based on hard science. Just because you know “more” does not make you better at transgression. There is a strong connection between user and computer (Carlsson 2012).

The performers that receive the most attention are typically those that express mastery over their machine by building impressive software demos with elegant algorithms²², using as few bytes as possible. Menotti Gonring (2009) explains “the filmmaker does not only aim for

²² Algorithm: A operation to be performed by a computer. These processes are written into the codes of software.

the equilibrium of compositing and montage, but also for the efficacy of the subjacent code”. The 8-bit format allowed for music files incorporated without samples that would take up a lot of storage. Instead, the files contained information for the soundchip to play, incorporated into the demo program. However, with the Amiga, samples became the new format as it was not equipped with an analog type sound chip.

The musicians of the demoscene are said to have been attracted by the limiting format and the aesthetics that followed (Carlsson 2009). Craftmanship was in focus and, just like today, the music could be written in any musical style. Carlsson explains, “A focus on craft can result in an increased tolerance for alternative styles; as long as there is good craftmanship it is, at least partly, a good artifact. This seems to be a good starting point for a sustainable network culture”. The fact that chiptune lives on today is certainly proof of this.

It seems chiptune as culture has roots in a quest for technological virtuosity as well as free market philosophies, utilizing creative commons licenses²³ and file sharing. “Compos”, live competitions where chip musicians showcased their technical skills were the original format of performance. Later, common formats of releasing and showcasing chipmusic have been compilation albums curated by netlabels²⁴ or the community or by simply uploading them to online media repositories like 8bitcollective²⁵. The competitive spirit is still a part of chiptune, but no nearly as much a part of the discourse and communication of the scene.

Paul (2014) notes, “Chiptunes in their strictest definition are songs produced directly from the original audio hardware microchips such as the popular Commodore 64 MOS 6581 SID chip”. This as purist as it gets and is a statement you rarely hear these days.

Carlsson (2009) concludes that the demoscene was not about making revenue but rather grew out of a will to break copyrights. “Artifacts in the demoscene have nothing to do with money and everything to do with showing skills for a bounded culture and are thus conspicuous productions”. This seems to apply to the first generation chipmusician, an interest in the art form rather than pushing it towards commercial success. The aesthetics were in being able to sustain your own needs for software and knowledge to contribute to the demoscene with impressively elegant music programming. Innovation and virtuosity is at the core of the

²³ Creative Commons: Copyright licenses that allows for other creatives to incorporate the music. There are variations to these licenses that allows for different methods of incorporation.

²⁴ In the words of Patryk Galuszka “Netlabels are platforms for online distribution and promotion of music released for free under Creative Commons or similar licenses.” Galuszka, P. (2012). "Netlabels and democratization of the recording industry." First Monday 17.

²⁵ 8bitcollective.com was the most active online media repository and forum for chiptune music in the 2000s. Unexpectedly closed down around 2011, but archived and accessible through the Wayback Machine <http://web.archive.org/web/20111009003537/http://8bc.org>

aesthetic, but so is copying. Gärder (2018) mentions in our conversation, “If programming your own music software to be able to make absolutely mindblowing music on a chip that is hard to learn even with a tracker with nice modern UI is not original chiptune, I do not know what is”. A do-it-yourself attitude has been established, and this mentality has continued to influence the discourse on chiptune ever since.

3.2 The Artist

Some would claim the most impactful event to happen to chiptune music was the release of LSDJ in the year 2000. It marked a clear shift in aesthetics, methods and community. In fact, it created a new community with few connections to the demoscene. Compared to choosing from the many tracker programs and computers used in the demoscene and dedicating time and effort in becoming efficient, LSDJ was an intuitive and welcoming tool. At least in comparison, though perhaps not to anyone. Regardless, it did not require prior programming knowledge and, even though it had a steep learning curve it seemed more welcoming to users uninformed of the massive amount of knowledge created in the demoscene.

Gärder (2018) mentions how the first generation would separate Nintendo console music from chiptune. They would call it Video Game music, abbreviated to VGM. This might have been part of the reason for why there was a distance between the second generation and the demoscene. However, with the establishment of 8bitcollective, which used a game boy in its logo next to calling themselves “first completely open free chiptune-related media repository”, the connection was inevitable. 8-bit culture was now rising in popularity and gained attention from the mainstream. 8bitcollective had gained a large following, and throughout the early 2000’s it became an apparent retro culture that gained interest from those with a nostalgic relationship to the console. In 2003, the former Sex Pistols manager Malcolm McLaren discovered the scene and approached it. He was met with a certain skepticism and protectiveness. However, after publishing an article on the phenomenon in *The Wire*²⁶, as well as other mainstream media outlets, interest in the chipscene seems to have increased substantially.

With this generation certain values and features of the chipscene started to fade. Most notably the purism and process-oriented aesthetic was transforming. Game Boy music was now the new authentic chiptune. The culture was expanding beyond programming culture and an

²⁶ *The Wire*: A british avant garde music magazine

interest in imitating mainstream media and popular music became the norm. For the first time, chiptune was discussed as a music genre and certain chiptune pieces were excluded because of alienation to the new community. It seems like the articles of McLaren played a large role in Chiptune becoming categorized as a genre of its own. Carlsson (2010) notes, “This conceptual transformation was perceived as a threatening heterology by some chipmusicians”. New tools became available and – perhaps most importantly – portability became a feature of the chiptune format.

In 2003 there were about 50 parties mostly in Europe but also USA. The same year the ex-manager of Sex Pistols Malcolm McLaren made several appearances in mainstream media and talked about chipmusic as the new "8-bit punk" that revolted against a hi-tech karaoke-culture. In Sweden, the Gameboy-musicians Puss were nominated for a Grammy Award and there was even a weekly chipmusic show on national radio. Chipmusic was entering in a dialogue with other pop cultural phenomena, which diversified the ideas and uses that surrounded chipmusic. Technological purism became less relevant when chipmusic became a music genre among others. Bands like Slagsmålsklubben who made beepy pop music that reminded people of old videogame music, were sometimes labelled as chipmusic or chiptune although they used analogue synthesizers. Chipmusic was discussed as a music genre more separated from technology. As a consequence, more experimental and dark types of soundchip-based music was not necessarily labelled as chipmusic. (Carlsson 2010)

This chapter will discuss the second generation of chiptune musicians, often referred to as the Artist. To some, they are the original Chiptune artists and to some they resulted in transforming the word chipmusic from what it was intended to be. Regardless, it is perhaps the most important generation in this thesis due to the influential effect they had on both internal culture and pop culture.

3.2.1 Community

Since chiptune gained mainstream interest in the twenty-first century, Tomczak’s perspective on its style and aesthetic has been persistent in parts of the scene. Anti-consumerism has set the mood for a punk-esque traits in ideology and fashion, as noted by the former Sex Pistols manager McLaren (2003). He claims the values of the genre being accessibility and rebellion towards expensive productions and karaoke culture. However, this is just one side of a larger issue that affected the community in this period.

Chipmusic exploded as a cultural phenomenon in the early 2000’s as the next generation of, mostly youth producers embraced and evolved its aesthetics. Some had backgrounds in music

production and for others it was their first introduction to the world of electronic music. Chiptune was gaining worldwide interest and expanded way beyond the Scandinavian demoscene, especially after being recognized by McLaren (2003) which spiraled into more media coverage. Most western homes had internet access and the influence of chiptune on popular culture became apparent. The media repository played an important role in establishing an accessible and active community, but most notable for this generation was the organizing of chiptune exclusive festivals and live shows. Up until this point the chipmusicians were hesitant to call themselves artists and rather saw themselves as programmers and gamers. (Polymeropoulou 2014) The second generation however embraced the concept of being an artist and aimed to be recognized as such. Chiptune-shows and street performances started to appear all over Europe. At the peak of its popularity in Europe, it also nearly exploded in popularity in the USA. Carlsson (2010) claims, “In 2003 there were about 50 parties mostly in Europe but also USA”.

Carlsson (2010) even goes as far as to theorize if McLaren was responsible for the chiptune community as a whole. Not just for the attention it directed towards the scene, but for fueling the protectiveness that it inhabited. Some felt as if McLaren was attempting to take credit for the chipscene and misinformed the public of its history, philosophies and values. More mainstream media outlets also started covering the chipscene, using what the chipscene often would argue to be ignorant simplifications of the aesthetic. Carlsson (2010) theorizes, “The transformation of chipmusic in the early 2000s can be seen as a so-called defensive discourse of orthodoxy against McLaren and other ‘threats to the tribe’. It is an (un)conscious strategy to distance yourself from something, and so you develop anti-rhetorics”. Did this ant-rhetoric perhaps set the mood for a lot of the internal discourse in the chipscene in later times as well? Certainly, the many cases of plagiarism²⁷ that followed did not help on the protectionism in chiptune but may have strengthened the chipscene as a community. I will not touch on the plagiarism controversies more than a footnote, but they are worth noting and became a staple of the internal discourse.

²⁷ The Timbaland Plagiarism Controversy: The producer Timbaland was accused of plagiarism when assumingly sampling music from Finnish and Norwegian chip tune musicians in the Nelly Furtado track “Do It”. Read more at <http://www.pelulamu.net/timbaland/>. There were also many other controversies on plagiarism by for instance Crystal Castles.

3.2.2 Hardware

The Game Boy was already a video game console found in most attics, garage sales and video game console collections all over the western world. LSDJ, created by the Swedish Johan Kotlinsky, soon became the most popular format for new chiptune musicians. It competed with another sequencer style program called Nanoloop, released just prior to LSDJ, as well as a few other music programs. Suddenly, chiptune production was available to anyone in possession of a Game Boy, given they were able to acquire a cartridge containing LSDJ or Nanoloop. There were LSDJ-cartridges created by the author, but the production ceased after a while and the only way to run the software was to put it on a flash cartridge²⁸. However, this did not stop the rising popularity of the format. Instructions on how to acquire and operate it was easy to find online through forum posts and tutorials.

The Nintendo Entertainment System – often abbreviated to NES – was another console that increased in popularity in the second generation. Introduced to the Japanese market in 1983 as the Famicom, it saw its first release in north America in 1985 and in Europe in 1986. Like the Game Boy it also benefited in the aspect of accessibility as it was a common video game console to find in attics or buy for cheap at yard sales. The sound of the NES is in many ways similar to the Game Boy but had a few differences in hardware limitations. For instance, this console played sound in mono. However, the chipscene often made modifications to its sound chip, the 2A03 chip, to separate its channels for stereo playback. The sound chip had 5 voices; two square wave generators, one triangle wave generator, one noise generator and a channel for 1-bit sample playback.

The cost also seems to be a big attraction of chiptune production now. Game boys were sold in yard sales and flea markets all over the western world for very cheap. It was therefore an easy way for, for instance, students to write music. McLaren mentions in his Wired article, “The nature of the sound, and the equipment used to create it, is cheap. This is not music as a commodity but music as an idea” (McLaren 2003). Tinkering with the electronics and making modifications also became a big part of the process. This has also added to the aesthetic and shows the do-it-yourself attitude of the community.

Getting a cartridge with a music sequencer or modifying a pre-owned console was not a big investment compared to buying professional music software like Pro-tools. Recording

²⁸ Cartridges for the console that have flash memory, meaning it can contain homebrewed software.

techniques did not require expensive tools and experienced engineers. This do-it-cheap approach to music is also reflected in the methods of distribution as well as other aspects of the scene.

3.2.3 Practice

The Game Boy was used to create music mainly through Nanoloop or LSDJ. The latter is often mentioned to give the most control of the hardware. Treating the limitations using certain techniques and compositional strategies became a big part of the aesthetic. You were still facing the limitations of simultaneousness so techniques like quick arpeggios were adapted from the demoscene. In LSDJ they evolved many of these techniques using the many effect commands available. The arpeggios were panning from left to right and given musical depth with the use of tables. The techniques used in the early-day demoscene were, in a sense, given more musical depth by the second generation. There are many examples of techniques, but the arpeggio is certainly a good example. It manifests the many aesthetical changes that chiptune has gone through and is perhaps the clearest recurring element of musical content in chiptune.

On the internet, recorded chiptune music was released in the form of audio albums, singles and extended play albums as opposed to programs. There were compilation albums curated by netlabels that promoted the artists of the chipscene and the music they contributed to it. Next to this, anyone could upload their tracks to the media repositories. This way, artists created a lot of awareness about each other and strengthened the community by discussing each other's music online. On 8bitcollective the music was always available for download as mp3 and using the "pay what you want" option on Bandcamp was a common occurrence. Bandcamp became an especially popular distribution platform for the chipscene after it was founded in 2007. Soundcloud, another social media for music producers, became another staple website for distributing chiptune.

The Game Boy was a great tool for performing chiptune music live. It could be connected to any kind of audio mixer with the right cables. All you needed then was a sound system that could play the chiptunes loud. This format became incredibly popular and still is to date. For the NES, this was also possible but would require different equipment, for instance, a monitor for video output. However, the NES hardware could also be modified to be more intuitive for live usage.

Another notable attraction to making chiptune on some obsolete hardware is portability (Tomczak 2011). It may act as a creative motivation to write a song on a 1989 Nintendo Gameboy while sitting on the bus. Being able to then bring said game boy to a different country and perform alongside your internet friends made for an interesting motivation. The connection to personal nostalgia and childhood videogames are certainly for some, later users in particular, a strong motivation. It is also noted as a reason for writing the music on the hardware and arguing about the authenticity of emulated chiptune. However, a lot of artists have noted that the portability itself is the greatest feature of Game Boy music. You could fill music production into the gaps you had in your everyday life, whether it was waiting in line at the doctor's office or commuting by bus.

3.2.4 Aesthetics

The second generation seemed somewhat conservative in terms of authenticity but more interested in pushing chip music towards the mainstream (Polymeropoulou 2014). There was also a new appeal to the chipscene as home production and all-encompassing software was introduced. Carlsson explains "Some people saw chipmusic as a way to go back to the roots. The limited amount of options and lack of user-friendly interfaces had a "raw" feeling compared to other digital tools. It was possible to take charge and push the machine to its limits, which demosceners had been doing for a long time already. For others it was a way to give up control and to accept the built-in characteristics of the media" (Carlsson 2010, p. 10). This is what I have always believed to be the main aesthetic of chiptune, but for this generation the pop-cultural influences seem very important. The rebellion that Tomczak (2008) describes was still a part of the motivation, but not in the same way as in the demoscene.

Once mass media directed its attention towards the chipscene and the musicians had to explain what and why they were doing, musical aesthetics were rarely mentioned. The focus was directed on the technology.

Many people seem to associate second generation chiptune music with valence and energetic compositions. Oftentimes it was imitating the music that was becoming popular in the culture of electronic dance music, but incorporated melodies inspired by video game soundtracks. However, this was not always the case. All sorts of music genres were mimicked or adapted on the Game Boy. House- and dance-style music definitely became the most prominent

sound. Interestingly, the sounds of chiptune has since the 2000's been noted to influence pop-culture as well as being heavily influenced by it (Carlsson 2008, Polymeropoulou 2014). To me, it would make sense that the medium was being used to create danceable music, just like all other forms of electronic music. It also suited the rave-like characteristics that the live shows started to adapt. Soon, the chip sounds were also being part of high end productions. Other producers were exploiting the emotional power of nostalgia in the ongoing retro-fixated pop culture.

Competitive atmosphere was certainly a big part of the second generation, similar to the first. In the case of the second, it was less about establishing groups and becoming *elite* and more about individually creating the best piece of music. 8bitcollective is often credited for their success due to the top 3 tracks featured on their front page. Every week this section would be updated with the three tracks that had received the most attention from the users. Because of this, it also seems to me it kept up the discourse of authenticity. Competitiveness can perhaps be responsible for aggressive claims made between users, but it is a bold statement to make. It is however an interesting question, did the competitive atmosphere sustain this discourse?

As the second generation gained a large base of members, Chiptune became a genre rich on discourse and criticism. The scene had a network of experienced performers with in-depth understanding of the creation of chiptune (Paul 2014) but also gained new members introducing new perspectives on music. However, those trying to claim ownership to the genre were quickly opposed. Malcolm McLaren became an example of this. As he expressed a need for the scene to go global and that he could give the genre what it needed, the response was clear.

"We feel that the micromusic scene is already global, with members in every continent, and local headquarters in Basel, Berlin, Brussels, Enschede, London, Los Angeles, Melbourne, New York, Paris, Stockholm, Newcastle and in Poland. Aside from micromusic.net, the wider chip music community stretches further even than this! Malcolm, we welcome your support, but we managed to get this far without any outside assistance, and we have not even got started yet" ("gwEm" 2004)

The sense of an independent community was certainly a part of the aesthetic for the second generation, even though the massive mainstream media attention increased its numbers.

3.3 The Chipster

As the second generation of chipmusicians evolved, there was clearly an interest in being acknowledged by mainstream culture. Artists were taking their musical careers seriously and the internal market for chiptune was rarely enough to sustain a decent income. Around the time I joined the scene there was a widespread fascination with discovering sounds of similar aesthetics to chip music in mainstream media. In many ways it was an interesting addition to the ongoing discourse of what should be defined chiptune. While more and more people welcomed mainstream coverage and certainly enjoyed the recognition, others argued that it was in no way positive to the scene. Perhaps this separates the Artist from the Chipster?

3.3.1 Community

The now global chiptune community was still mainly communicating online. New media repositories and forums were popping up, like Noisechannel.org and Battle of the Bits. 2011 saw the sudden disappearance of 8bitcollective and when trying to access the site, you were greeted by a message promising its return. This never happened. The disappearance of 8bitcollective marked a big change in the community, but it seemed to have been happened during a transitional phase. There was no longer one portal containing the vast majority of chipscene discourse and media. Some panicked due to the amount of music that had been lost and some were happy about it because they did not like the way the community was going. Either way, it left a hole in the community that many smaller groups would slowly but surely fill. In a sense 8bitcollective contained the chipscene as one community, but once it was gone the chiptune musicians seemed scattered to the wind. The discourse had certainly changed from this point. Chiptunes = WIN, with its own expressive style and non-purist ideology gained the largest following. It seems to me that since this group appeared, the purist ideology and hardware discourse started to fade. Yet, there were many new live events being arranged throughout the world and the sense of community persisted, even though it had changed. I believe the third generation only covers a brief period of time in the final years of 8bitcollective and a few years after. The chipscene as one community was at its peak, but so was the heated debate about authenticity.

Chiptune has been, in a sense, mistreated in the mainstream media on many occasions since the McLaren situation, misinforming interested newcomers. Headlines such as “Chiptune is not just for Gameboys anymore” and “Mario at a Rave” might have given the community an

element of confusion, as well as frustration in those that had roamed the forums for longer. It blurred the aesthetic between video game nostalgia, musical expression and tech-oriented aesthetics. It was apparent upon my entry to the scene that there was an argument about what chiptune was. The best description mainstream media could give of the genre was in regards the technology used, next to seeing it in context of video game culture. This left out the musical and expressive aspects, the aesthetics. It left out the human and focused on the machine. A portion of the community certainly felt misunderstood, but now the protective community was starting to fade. However, the sense of community was also being strengthened by the mistreatment by mainstream news outlets.

Independent video game developers would often use chiptune musicians to create soundtracks for their games. Chiptune music is now often associated with such indie games, a genre of computer games that were rising steadily in popularity. Up until around 2010 the number of members seemed to be rising exponentially, but it was difficult to differentiate between who were and were not knowledgeable of chiptune as a cultural phenomenon. The ideologies of the past were rarely adopted by the third generation. This might have only added to the confusion. What exactly is chiptune and why are everyone fighting about it? The question “is this chiptune?” would be so common it turned into a recurring meme²⁹ and the community in a sense started to become metacritical. Carlsson (2015) states it best, “McLaren pushed the chipscene into puberty, and it began to search for an identity”.

The element of trolling³⁰ that Polymeropoulou (2014) mentions is however something I only saw in certain influential figures in the scene at this time. My theory was that they were just fed up with the confusion and found it more entertaining to fuel the fire. It was not something that belonged to the musical aesthetic of the third generation chipmusician more than the few jokes a few artists were making. However, it certainly became a part of chipmusic as culture. Next to this, a lot of these artists seem to have joined the scene as it transitioned from the second to the third generation, thus not having the same element of confusion as those joining later on. The aesthetic was transitioning into being more influenced by internet culture. In a sense this may have split the second generation from the third. If artist endeavors with all the aesthetics that had belonged to the second generation was being replaced with internet culture and references they may have felt threatened. However, it is important to note that the third

²⁹ A meme is an idea or behavior, commonly a joke with a certain style of sarcasm, that is spread within a culture.

³⁰ Polymeropoulou, M. (2014) Chipmusic, Fakebit and the Discourse of Authenticity in the Chipscene. trolling as giving misinformation to outsiders in “a game about identity deception”

generation was a much more varied bunch of people. This element of confusion was only apparent in certain parts of the scene. If we would describe the third generation of chiptune musicians with trolling it would only include a few individuals.

3.3.2 Hardware

The third generation is noted by Polymeropoulou (2014) for accepting emulation. However, Carlsson argues that the hardware fetishism first occurred with this and the previous generation (Carlsson 2014). The amount of LSDJ music available online was dizzying and the chipscene was highly saturated by it. Eventually, electronic dance music written on LSDJ became the sound of chiptune. Emulation was now a subject that was discussed a lot on the forums. This was most likely the result of the technology-oriented media coverage chiptune music had received. Innovation was perhaps more important than ever. Usually this was done through tech-oriented innovation on the hardware or in placing the non-obsolete hardware in new creative formats. Emulation became an intuitive and cheap method to do the latter.

The laptop was an important piece of hardware to this generation. Many third-generation artists were adapting the chiptune aesthetic to DAWs like Ableton Live and Fruity Loops. Some would learn the chiptune techniques by ear and adapt them to a high end electronic music sound. Combination of modern synthesis, live instruments, sampling and chip sounds became extremely popular.

Even though it has been noted that a motivation behind making hardware chiptune music was in how cheap the hardware was, this had certainly changed by now. A Game Boy could still be bought for cheap in a yard sale, but the other equipment necessary to use LSDJ was more expensive than the Game Boy. Most of the third-generation musicians already had a PC at their disposal and most emulation software was completely free to download. The economic aspect had shifted from benefitting the game boy musician to the laptop producer. Aupetitgendre (2018) reflects on the expenses of hardware chiptune during our conversation, "... I actually started from a daw background and because I had to buy hardware when I was a very penniless student I never judged people for not using hardware".

There was a lot of new software being developed to improve chiptune emulation on the computer. Plogue Chipsounds was introduced to the VST market in 2009 and was praised for its authentic emulation of a variety of chiptune hardware. YMCK released their free VST Magical8bitplugin which emulated the NES sound chip. To date, there are still emulations

being introduced to the market, but for the third generation it certainly influenced the sound. Tomczak (2008) gives in depth details on the benefits and cons of emulated chiptune. He briefly covers the benefits as follows.

Ease of integration with modern production tools which is becoming more and more relevant in music production. Incorporating a real game boy into a digital studio requires a lot more effort than running a sample based VST-plugin

Affordability with free software emulation being cheaper as compared to buying chiptune hardware as long as the user already has a computer

Accessibility as, for instance, the number of game boys in the world only decreased due to Nintendo stopping the production of these while digital emulation is easily distributed online in unlimited quantity.

The issue of the Human Interface which covers the aspect of limitation not present in computer emulations, while being a big constraint in hardware chiptune.

3.3.3 Practice

Mastery of the Game Boy had become a big part of the aesthetic. Innovation with techniques was at its peak. Artists such as Trey Frey, Chipzel and Je deviens dj en 3 jours gained recognition for being able to put the Game Boy to new use. They created their own sound in a format that was considered highly limiting and overused. Their music was recognizable and showed innovation and mastery within these limitations. Sometimes, by applying new techniques and pushing the format to its limits. To some, this became the true chiptune aesthetic and was still highly influenced by hacker culture.

Some artists transitioned from writing music solely on the Game Boy to using it alongside modern production tools. Sabrepulse may have become the most influential figure to this wave of musicians. Not only did he create a recognizable sound when combining hardware chiptune with modern electronic music production, he also managed to create a name for himself outside of the genre and experienced commercial success. Another highly influential music act of this generation was Anamanaguchi, who used the NES in the context of a rock band. They are perhaps the former chiptune act with the greatest commercial success to date and are still active. They made it apparent that chiptune was an instrument, just as much as a

production tool. By playing their instrument alongside the NES they seemed to have inspired many other acts to use the hardware in similar ways.

The third generation typically used the same methods of distribution as the previous generation. However, some of them were more interested in distributing the music through the larger music outlets. Some of these artists can be found on iTunes and Spotify, but still very few of them would get signed by music labels. Soundcloud increased in popularity and became a place for the chiptune musician to target the mainstream media as opposed to strictly targeting the chipscene.

3.3.4 Aesthetics

Musical aesthetics were often deriving from the many subgenres of electronic music. In a varying degree the chiptune artists would apply musical characteristics from video games. Most notably the focus on melody. They could give a feeling of nostalgia when resembling the compositional structures of old Nintendo games. Arpeggios were also applied as a chiptune aesthetic in both hardware and emulated chip music. It seemed to me like Fakebit music was mimicking video game soundtracks more than hardware chiptune in this generation. Fakebit musicians adapted the aesthetics of these soundtracks and applied it to modern electronic music, while hardware chiptune was rather trying to escape from the association. If it is true that the biggest motivation to join the chipscene is through the nostalgic attraction of chip music, as suggested by Paul (Paul 2014, p. 1), this could surely be the case of some third generation musicians.

Chiptune adapted a somewhat maximalist and exaggerated style towards the end of 8bitcollective. Excessive use of caps lock³¹, seizure inducing animated GIFs³², absurd humor and vulgarity were common in titles, comments and releases. I was clearly an example of this in my early work. It seemed like a way to work around the competition for newcomers. By directing interest through eye catching titles and pictures it was easier to gain recognition from the scene and perhaps hit the Weekly top 3 on 8bitcollective. Soundcloud had also adopted the competitive atmosphere and these solutions were transferred over. This seems to be partly to blame for the vague description the third-generation user has gotten. Internet culture became fashionable. This could have been a result of the popularization of chiptune

³¹ All characters written on a keyboard with Caps Lock on will be upper case

³² Graphics Interchange Format: A bitmap image format that support animation. Supported in many smaller scale social medias and forums

and a downside of the media repository as the numbers of submissions and users increase and the fight for attention becomes more relevant. After the disappearance of 8Bitcolletive the use of upper case letters, eye catching titles and descriptions prevailed on Soundcloud and in communities that came after. Some netlabels, communities and artists adapted this as a style that felt at home with the genre while some seemed to dislike it. It has become another dividing factor between the chip generations, but also seems to be a dividing factor within the third-generation users. It clearly shows that individuality was becoming important in chiptune music.

Certainly, the perception of authenticity is in constant transformation with this generation. However, some see it in terms of musical aesthetics and some in hardware. Maybe, in the case of chiptune, aesthetic transformation happens at an even faster pace than most other genres, considering the influence of new technology and pop culture. Aupetitgendre (2018) mentions this in our interview as well. Mainstream media has often been claimed to be delusive and misinforming as to what the values and aesthetics of chiptune is. Descriptive headlines such as “Mario at a Rave”³³ in articles describing chiptune as a genre and scene explicitly associated with gaming culture led to a backlash and distancing between the community and mainstream media. Looking through forum posts and discussions by community figures of the chipscene about similar coverage there seems to be a feeling of misjudgment and mistreatment by news outlets and mainstream media. The main assertion is that journalists, at times have not put enough effort into researching the genre. The tendency seems to be to have their representation of the scene mainly based on descriptive aesthetics, while the interpretative ones have shown less agreement from the scene itself. Counterarguments have been that chiptune has become too vague of a term and everyone have the right to define it as they see fit with their own experience of it.

Another element of creative appeal and aesthetic value noted in academia is nostalgia (Paul 2014). A positive sensation of being in touch with pleasant memories by recognizing the sounds of the sound chip. Basic waveforms, low resolution noise and simple melodic compositions evoke certain associations with sound effects and music from the ‘80s and ‘90s golden days of gaming. For a chip musician it can also be nostalgia rooted in simply using these consoles, but in the third generation it seems more based in the timbre. This suggests

³³ Orlandoweekly’s article on one of the biggest role models of chiptune at the time, Anamanaguchi was quickly criticized in the forums of Chipmusic.org Primate, J. (2013). MARIO AT A RAVE: THE LEGEND CONTINUES [ANAMANAGUCHI EDITION VOL 6].

that chiptune is rather a tribute to the consoles and culture surrounding retro video games. However, some artists in the scene have expressed discontent with chiptune being explained as a product of nostalgia and video game culture. It is also a theory that does not sit well with the fact that the pioneers of chiptune could not have a nostalgic relationship to the sounds due to it actually being state of the art technology at the time. The associations to video games, while occasionally being the genre's blessing for mainstream appeal, has been a curse for those looking for artistic expression. In an interview featured in Orlando Weekly Anamanaguchi drummer Luke Silas explains "It is problematic when [chiptune is] still a very niche thing". He adds "When you are part of a culture like this, it sucks to get relegated to something so simplistic. It just does not say what it actually is". However, later on in the interview he concludes "It is not like we are going to say, 'Well, there's absolutely no connection between us and video games ever,' because no chip musician can really honestly say that, but we try to be mindful of it" (Ali 2013). There seems to have been a certain agreement between long time users that chiptune is not about video games or nerd nostalgia but rather an aesthetic connected to technological virtuosity as well as individual artistic expressions.

Upon the release of this interview there was already a discussion about whether they should fight the video game connection or not. Patrick Trinh argues that "videogames association with chipmusic has stuck around because of interactivity and multimedia". Because of the way our memory connects the simultaneous elements of our experiences with video games where music, mechanics, graphics and storylines are all part of the art we associate one thing with another (Trinh 2013). As well as interactions with the game, the setting and everything in regard to time and place where the game is played becomes associations we connect to chipmusic. He also argues that interactive media gives a more robust memory of the experience as compared to non-interactive. This could explain why chiptune might have been such a popular phenomenon especially between 2000-2010. those who grew up in the 8-bit era have established a strong nostalgic relationship to the sounds in the age where you might start writing music or tinkering with electronics. Upon further reflection it would seem to me that this is a very unique case too, considering the amount of involvement and interaction demanded by these video games. Childhood memories with video games are simply easy to remember and be reminded of. The video games that I associated chiptune with, takes me back to comforting memories of my friends, childhood and early day interests. However, these associations were rarely part of the discourse on chiptune aesthetics and must have been

rather unconscious. I would much rather have argued for the community creative process to be the biggest appeal. The way I see it, Chiptune can be associated with video games as much as the artist wants when experienced by the chipscene. However, once interpreted by uninformed outsiders the association is not avoidable.

4 THE FOURTH GENERATION

It is difficult to grasp what *authentic chiptune* means today and the work of Polymeropoulou (2014) has not really touched on musical aesthetics. Defining the aesthetics of chiptune today compared to before 2011, the year 8bitcollective closed down, presents different challenges. Mostly because there is no longer one medium where music and community is discussed. Up until this point the community was more compact and utilized fewer platforms for communication. The discourse has been spread across the many social medias and chatrooms being utilized by the scene. At the same time, a denial of the discourse has made it problematic to find cohesion between the many perspectives ruling the current chipscene. My hypotheses suggest we are forced to make a division. The third generation might still be the current generation and the features described by Polymeropoulou (2014) are still represented by some of us. However, the division will give insight into the actual aesthetics of this generation. It is noted that the current generation puts focus on the community and the aspect of chiptune culture (Carlsson 2015). Even though the community glues the third generation together in creating aesthetics, there are endless approaches to the process. In the fourth generation, there are rather multiple communities. Some artist are purists in their own methods but still listen to fakebit and accept fakebit as chiptune. Some are fakebit producers, creating music where the sound chip plays only parts of their composition, but listen to hardware chipmusic. Yet they communicate more in separate groups. In the current chipscene, the two ideologies interact in a more positive way by influencing each other, both in terms of musical content and methods. Chapter 4.2 will demonstrate this.

I think a clear point in time where the fourth generation starts is when 8bitcollective closed in 2011. They are less influenced by the discussions and arguments that went on there yet experience the discourse through real life connections. They are influenced by the aftermath of the discourse, present in comment sections and chatrooms. During interviews with Paul Aupetitgendre and Tobias Gärder I ask for thoughts on authentic chiptune as well as their own process.

4.1 Interviews

After having discussed and reflected upon the three generations I conducted my two interviews. They provided two interesting new perspectives on the discourse of authenticity. Aupetitgendre joining around 2011 and Gärder in the early 1990's. Interestingly enough, the latter did not have a purist ideology and made chiptune using the modern DAW Ableton Live. Aupetitgendre however claimed he would only make music projects on LSDJ, but not seemingly not because of an ideology. It was rather because the software was a valuable creative tool with features he preferred. He notes LSDJ's many benefits to his production process. Interestingly enough he also mentioned using DAWs up until discovering the work of Chipzel, which made him convert to the Game Boy. He notes this as a reason for being open minded about emulated chiptune music but expands on this subject later on. Perhaps a characteristic of the fourth generation is coming from modern production methods.

The interviews were proof that the topic of *authentic chiptune* still wakes some negative associations. This has also been noted in other research. I feel ethically inclined not to reveal each interviewee's personal relationship to the discourse due to the weight of the subject.

4.2 Adapting the Tech-Oriented Aesthetic

In this chapter I will demonstrate that the tech-oriented aesthetic from obsolete hardware is transferable to modern production tools. My interview with Tobias Gärder has supported my theory that this is starting to occur in newer fakebit music. Gärder (2018) remembers writing a collaborative song with the artist Robotprins and reflects on the process: "... after switching to a daw I've tried to get rid of my old tracker habit, then I made a track with Robotprins. He actually has all the notes with all the delays manually dotted out, like you would in a tracker, but I do not think he is a tracker guy. But he used his daw as a tracker, dotting every note, adjusting the volume on every note by hand". This is of importance due to a notion that this aesthetic belongs to obsolete hardware chiptune in academia. I have chosen to use a technical approach to arpeggios deriving from LSDJ programming. I have not mimicked this approach before but will document my process of learning to do so in this chapter. My conversations with Aupetitgendre is the most important source of information to learning this. He has explained the technique to me in detail and by analyzing a song he has written alongside Maxime Roulleaux I will adapt a section of the song to Renoise.

This chapter will use the track *Tournesol*³⁴ by the chiptune duo Pain Perdu – released September 16th of 2017 on the album *Nouvelle Lune*. It is a track I have admired for its harmonic richness. The track is written and recorded on a single Game Boy running LSDJ version 4.9.5.

It opens up with a set of chords performing the opening riff of the song. Some might call it common knowledge that chords are a set of notes played at the same time to create harmonies. Harmonic information is a strong tool for creating an emotional response to a musical piece, as well as giving the melody or bass line of a song tonal context to move around. It can also give the music an important feeling of progression or movement by using different types of harmonic tensions like in a dominant chord. However, no sound chips commonly used in the chip scene can give the flexibility and symphonic depth of an orchestra or rock band. In fact, when writing music on a sound chip, chords are near impossible because they will usually take up multiple channels. A channel of the Game Boy can with conventional use only play one note at a time. So – with no option of creating simultaneous chords on a sole channel – how do we then give the song at hand harmonic information? In chiptune the solution is quite unique as chords typically takes the form of arpeggios, meaning that each note is played consecutively. This has been a staple of the chiptune sound since the first generation. Of course, arpeggios are common in many genres, but in chipmusic it has a tendency to be played at rather extreme speeds. This is considered a technique deriving from the Demoscene, however it is also found in original soundtracks from games on many obsolete consoles. One of my first memories of these arpeggios are with the soundtrack from “*Spiderman GBC*” for the Game Boy Color. The use of quickly arpeggiating chords have been there from the start, however finding the first occurrence has been practically impossible.

Arpeggios are not only common in creating chords, but also when creating lead voices. Arpeggios moving in octaves³⁵ can give a lead melody the effect of covering more of the frequency specter. This is a technique found in many chiptune tracks. Using arpeggios to give harmonic context is not exactly revolutionary by itself. It has been a common technique in smaller scale baroque string ensembles or solo pieces like Bach’s “*Sonatas and Partitas for Solo Violin*”. What makes the chiptune arpeggios truly characteristic is rather the speed.

³⁴ *Tournesol* by Pain Perdu: <https://cheapbeatsmusic.bandcamp.com/album/nouvelle-lune>

³⁵ Octave: an interval of 12 semitones. An octave up is for instance doubled the audio frequency of the original tone.

The harmonic information presented in the intro of Tournesol and throughout most of the piece is in fact performed by one voice on the Game Boy. One note at a time, it gives the listener a lot of the same information as if the tones were to be played simultaneously. I was wondering what kind of technological limitations the producers of this track face and how they had gone about creating these chords. Next to that, there is a certain richness to the sound I cannot analyze by ear. In fact, I do not believe I have heard this kind of arpeggio sound before this track and it is possibly a big reason for me really liking it.

4.2.1 The Basics of Chiptune Arpeggios

In April 2017, I had a conversation with Paul Aupetitgendre and Maxime Roulleaux in Paris where we talked about the challenges and rewards of making Game Boy music. With interest in collecting data for my research I contacted Paul on Facebook Messenger in March 2018 to ask further questions about this track as well as requesting the LSDJ song-file. He supplied me with the files I asked for as well as answering my many questions. He also supplied me with ideas and techniques I had little to no knowledge of beforehand. I will base most of my research on arpeggios and simultaneousness in chiptune on information given to me by Paul. Other references and academic material I've found tend to lack depth in describing the many variations of arpeggios and how they affect the musical outcome. This is important to the tech-oriented aesthetic. For the chiptune producer, this is oftentimes self-taught or shared through word of mouth (or text rather since a lot of information is being shared in chat rooms and forum posts).

In the words of Aupetitgendre the basic principle of creating chords on LSDJ is to “arpeggiate fast enough to create the illusion that a chord is played”. Typically, a chiptune arpeggio is played at the speed of a game boy tick which varies depending on the BPM³⁶ of the song. However, a chiptune arpeggio does not necessarily have to be played fast and it is very common to place notes on both 8th and 16th notes. If we wish to arpeggiate the chord of C major there are multiple variations that produce different musical outcomes. The changes are mostly relevant to how the arpeggio is placed in the rhythmical context. For example, a 4 note arpeggio will loop every 8th of a bar if each note is a 32nd note, however if there are 5 notes the arpeggio will loop ever 8th + a 32nd of a beat. This gives arpeggio a more complex rhythmical element than that of regular harmonies where and the way you design the arpeggio

³⁶ BPM: the tempo of a song is measured in Beats Per Minute. It is especially important in electronic music and often dictates what subgenre of electronic music it is.

and arrange the notes will affect the musical outcome greatly. Extended chord voicings and added chords like Cmajor7 and Cadd9 also bring in new aspects and challenges and many artists will say some things sound better in a chip arpeggio than others. Aupetitgendre explains the importance of periodicity and adds that the direction of the arpeggio is important:

“Some specific arpeggio patterns will accentuate their rhythmic outline, the best example of this effect is the downwards arpeggio, where the highest note will be at the start of the period, and act as a rhythmic attack. Consider the A minor chord voiced downwards A, E, C, A. If one period of the arp lasts exactly as long as an 8th note, you can create a strong binary, square feel to your beat with the arp, and vice versa with triplet patterns. A technique often used to blur the arpeggios into harmony and not have them stand out too much rhythmically is to use upwards patterns, and if the song is in binary, a ternary period and vice versa. Uneven periods like groups of 5 or 7 can also be used, either to blur the harmony further, or to create a polyrhythmic feel. What’s important is the relationship between the main time signature and feel, and the arp period” (Aupetitgendre 2018)

Which direction the composer chooses to arpeggiate the chord is very conscious and seems to be an important part of the composition. It decides what rhythmical effect it will have in context of the song, as well as affecting the character. Aupetitgendre separates the different variations as follows:

upward: swelling feeling, overall smoother sensation, despite the usually wide interval between the top and bottom notes, attack is generally smooth.

downward: the starting note, because it is higher in pitch, will act as the attack and be accentuated over the rest just by being there. hence, the periodicity of your arp will be more important, as it will create a clear-cut rhythmic outline.

up-down: middle notes will be repeated twice as often, interesting to utilize that to highlight specific note in a chord voicing.

cross: For example, for Cmaj7, instead of having C, E, G, B, play C, G, E, B. This kind of pattern is interesting because it combines upwards and downwards motions, blurring and accentuating their respective characteristics at the same time. (Aupetitgendre 2018)

These interpretations of the effect of each variation seem to be very accurate speaking from experience and experimentation. It also gives a lot of insight into the aesthetic of chiptune arpeggios and how big part of the sound it is. It is common to see arpeggios in evaluative criticism with classic examples like “I love these arpeggios”. It is certainly an important part of the tech-oriented aesthetic.

To create an upwards arpeggio the notes of a C major chord will be looped as presented below. However, it is important to note that the arpeggio can start on any of these notes just like a regular chord can be played in different positions or inversions.

C major

C – E – G

For Cmajor7 the loop can be

C – E – G – B

For Cadd9 the loop can be

C – D – E – G

It is common to skip some notes of the chord or play them an octave above or below. This is sometimes due to the notes being played in other channels on the sound chip or for creating other musical effects. The most important effect seems to be how the highest note in the arpeggio is the one we notice the most as listeners. By utilizing this we can create more musical movement within the chord progression. For example, a progression of Cadd9 to Eminor7 can be looped in an upwards direction like shown below to create a stationary lead tone.

C – E – G – **D**

E – G – B – **D**

The arpeggio can also be set to cover a wider tonal range. However, the more spread the notes are, the more attention it seems to demand from the listener. This might be due to how each note is perceived as more individual when there are more intervals between them. An example of Cmajor7 covering a wider tonal range would be as shown below in an upwards direction.

C – G – E – B

There are other elements that affect how we perceive the speed of the arpeggio, like how many notes and octaves it goes through in a cycle. The length of the cycle seems more important to how we perceive the rhythmical context of the arpeggio, more so than the subdivision of the chord. In other words, if the cycle is 16 notes but lasts one beat it would not differ much from 17 notes lasting one beat. This is only true for very quick arpeggios

however, and with more spread out notes like the previous example the way the arpeggio interacts with the rhythmical context seems accentuated in a peculiar way.

This is most likely due to how the tonal leap it makes between the last and the first note is much more noticeable. In a musical context, we can decide how prominent and focus-demanding the arpeggio is by utilizing this knowledge. For example, if we only want the arpeggio to give a harmonic context and not get in the way of an interesting rhythm or lead melody we can design the notes to be as close to each other as possible in terms of intervals. Aupetitgendre also notes how the distance between each interval gives a certain variety in musical effect within the arpeggio of a Cmajor7 chord. “When arpeggiated, the closeness of B-C will disrupt the chord illusion and draw attention to the arpeggio in an unsuitable way, sounding more like a pitch bend. By alternating notes this way: B, E, C, G, you end up with a succession of two 5ths instead of a 2nd and a 3rd, which not only balances the arp structure while keeping the same notes and voicing, and blends the chord together better thanks to wider intervals” (Aupetitgendre 2018). Whether or not it directly disrupts the chord illusion is something I have been curious about, it is certainly an interesting idea. I also want to add that this is not necessarily an unsuitable effect and can be used musically to emphasis certain intervals of a chord.

In LSDJ there are multiple ways of creating arpeggios, each with their own benefits and disadvantages. It seems to be a balance between workflow in terms of effectiveness and flexibility against complexity and details. It is important to note that effect commands are often used to make the arpeggios more interesting or give them aesthetic value. Typical effect commands are pulse width commands to create different sonic character to the notes or panning to make the arpeggio move between each ear and create a sense of room. I will cover this to the extent of my knowledge below. It is important to note that there may be techniques I am unaware of because they may not be documented.

The most common options for creating an arpeggio in LSDJ is either by designing the arpeggio in the Table editor and applying it to an instrument or using the “chord” command. The arpeggio can also be written out in the phrase editor, but this takes up a lot of space. The chord command makes the note inputted arpeggiate between the original intervals and two other notes which is decided by the following two decimals. For example, the command C47 on the note of C will arpeggiate the notes of C, E and G. The decimals each represent the number of semitones from the base note the arpeggio will move to. The speed of the chord

seems to be based on the speed of ticks, but I could not find anything about this in the user manual.

Perhaps the biggest disadvantage to the Chord Command is how you can only create three note arpeggios with no options for changing the speed of it. However, with a table editor the options for melodic variation and effects are much greater. This is often used in tech-oriented chiptune. 16 lines, each lasting for a standard of one tick (this can be changed with the Groove command), can make for some detailed arpeggio design. Especially when considering the looping command (command H) – which can a section loop within the table – can create polyrhythmic³⁷ functions. A benefit of creating an arpeggio with the table editor is that it will not take up space in the phrase window and opens for inputting effect commands. For example, a panning command that is supposed to be done in a musical manner and in conjunction to a panning effect on a different riff or audio channel might be easier to create in the phrase window. Therefore, any changes to for example pulse width could be done in the table editor since it is easier to consider it a part of the arpeggio rather than the composition itself.

The choice between a table-arpeggio, a command-arpeggio and a phrase-arpeggio seems to be made in context of what options the composer needs to keep open. For example, the effect commands of the phrase editor may already be used for something else like panning. Since only one command can be played by the phrase screen, the table editor comes into play to create multiple effects on the same channel happen simultaneously. For example, by creating an instrument with a table like this, you can control different effects like amplitude in the phrase editor with the envelope command (E).

Until recently I've been under the impression of Fakebit music underusing the detailed aspects of arpeggio design. However, the important function of an arpeggio in Fakebit is the basic association to chiptune the sound carries. My work presents many examples of this, mainly keeping the arpeggios rather basic in terms of effect commands and chord structure. My arpeggios are usually created with Plogue Chipsounds, a VST plugin that in this case emulates the Commodore64 sound chip. Using these tools, you are not limited to for example number of voices, but my main focus was to emulate sounds I had heard in Game Boy music as well as other types of chiptune hardware. To give it a more interesting character I

³⁷ Polyrhythms are conflicting rhythms played simultaneously

modulated the pulse width³⁸ of the arpeggio using the automation feature of Renoise. This makes for a few details in the arpeggio that can not be performed by a Game Boy. An example of this is the gradual change in pulse width rather than stepping through the 50%, 25% and 12.5% pulse widths available on a game boy pulse channel. Of course, the arpeggio was not necessarily written to emulate the Game Boy, but this is something I would possibly have wanted to for the sake of aesthetics had I known about the restrictions beforehand. Not all Fakebit producers prioritize this however, but in terms of authenticity to the original hardware it is certainly a choice relevant to authentic chiptune and aesthetics. Looking at the detailed aspects of arpeggio-design in LSDJ is something I have found quite inspiring and implementable in my own production methods.

I have come to believe throughout this research that the limitations you face on the Game Boy actually results in more complicated arpeggio designs. It might be rooted in a deeper physiological context where the question of how the limitations affect your creative approach to music maybe could be answered. It is hard to say why a fakebit arpeggio typically has a simpler structure, but I believe it can be due to the mindset LSDJ puts you in as a music producer. You are encouraged to make the most out of your tools and the best producers are often considered those that master this concept. It seems Tournesol is a clear example of this.

The arpeggio serves a different purpose in Fakebit but applying the same depth in technique to them could perhaps show more understanding of the original concept. Furthermore, this might result in a feeling of authenticity and add to the chiptune aesthetic of the fakebit song. It is however far from impossible to apply the LSDJ mindset to Renoise as well as other DAWs considering you still have the option to limit yourself. Even though the physical limitations are not the same, we can learn from knowledge the LSDJ user creates and apply it to create interesting results for our arpeggio. Of course, the basic rules still apply, such as the tonal structure of the arpeggio or the speed and rhythmic functions. However, there are certain arpeggio techniques and design tricks in LSDJ that is less common in fakebit due to availability of polyphony as well as access to audio effects like delay and reverb. The result will of course vary depending on what software or samples we use, but for this experiment I will sample the pulse waves of the VST instrument Magical 8 Bit Plugin by YMCK to create three Renoise Instruments. I will do this by rendering the audio of a C4 note for each pulse width and loop them sample in the sample editor of Renoise. It is important to note that when

³⁸ Pulse width modulation is often used with synthesizers to create a change in timbres, sometimes a chorus-like effect. It changes the width of a pulse cycle.

using this instrument, I will not be subjected to certain other effects and artefacts of the game boy. For a very well-informed ear this might create a suspicion that it was not written on original hardware, but it is not my intention to fool the listener. Neither do I have to be economical in terms of CPU and memory usage, at least not nearly as much as is required when writing on the Game Boy. This can be an advantage in terms of gaining more control over the resulting sound, but disadvantage in terms of aesthetics. It is an argument for it not being authentic chiptune. Another important difference is how Ticks do not exist in Renoise and we are not limited in how short a note or how precise an effect can be. I will however make each line represent one Game Boy tick.

4.2.2 Arp Stacks

Aupetitgendre expands on the concept of arpeggios with the idea of “arp stacks”. He mentions the depth of this concept and the assumingly varying relevance of the different aspects of it as there are too many variations to this technique with different outcomes and effects. This is however a technique I believe to be very interesting to apply a tech-oriented aesthetic to fakebit. He then notes how this is practically used everywhere throughout Tournesol. I will attempt to recreate some of these arpeggios in Renoise with my samples.

This concept utilizes both pulse channels of the Game Boy by combining two loops to create an arpeggio. Aupetitgendre explains the base of the technique:

“Channel 1 : 2-note arpeggio, perfect 5th (C-G)

Channel 2: same arpeggio, up a third (E-B)

Effect: C – E – G – B = Cmaj7

Uses 2 channels, but one transposed phrase per interval => great economy

Now i have one phrase/one instrument/one table per interval, from 3 to 9 semitones, by stacking them and transposing i can create any 4-note chord

With simultaneous patterns, different intervals give off different sounds. 2 stacks of thirds will not have the same sonic qualities as 2 stacks of fifths, even if the notes (CEGB) remain the same

Let’s spice it up:

Let’s make it so my notes always last two ticks in the table

Take the same pattern, with 2-tick long notes this time

Delay the second channel by 1 tick

You get the following:

C---- G---- C---- G ----

E---- B---- E---- B----

The overlap makes the chord more “believable”: each note overlaps with not one but two notes in a very short amount of time

*You can also do it with 3- or 4- tick long notes and experience with different delay times on the second channel. The increments are VERY short depending on tempo, but they sound very different.”
(Aupetitgendre 2018)*

Reading this I realize the meaning of “great economy” in this context and how it applies to the limitations of LSDJ. The chain editor has only one feature for changing the musical outcome of each phrase, being the transpose function. Since you have a limited number of available phrases per song file it is often recommended to use the transpose function to avoid spending too many per chain. By creating an arpeggio like this you can use the transpose function to create some of the most relevant expanded chords. However, creating for example suspended chords where the element of consistent fifths on both channels do not apply requires new sequences.

I believe this would make a great example for applying the LSDJ aesthetic to the Renoise instrument. By looking at how the arpeggio is designed in the Tournesol track at the timestamp 1:46 I can recreate it in Renoise. I will however only recreate the first bar since it will by itself demonstrate the concept. There are also other ways to do this but I the accuracy of my method is enough to make a comparison between the two formats.



Figur 7. An adaptation to Renoise of Tournesol's Arp Stacks, originally written on LSDJ

In this demonstration PU1 and PU2 are emulating the different pulse channels in LSDJ. There are certain elements making it sound different to the Game Boy version. For instance, the difference in amplitude changes from my translation to those on the Game Boy are different. There is also an element of dynamic compression being applied from the Game Boy hardware. It is important to note that this arpeggio would still sound different on different Game Boys. The samples I use will also only sound similar to the Game Boy pulse waves. It is not identical.

In Renoise, arpeggios will certainly not serve the same purpose to work around limitations as in LSDJ. This is because nothing is restricting you from writing out traditional chords in Renoise. The reason you would do it is to apply a chiptune aesthetic. With respect to the original hardware and philosophies you could do it as shown above. However, it is not as common in fakebit to write arpeggios with this kind of depth. It can be rewarding as informed ears may recognize the technique. It could show in depth understanding of an important

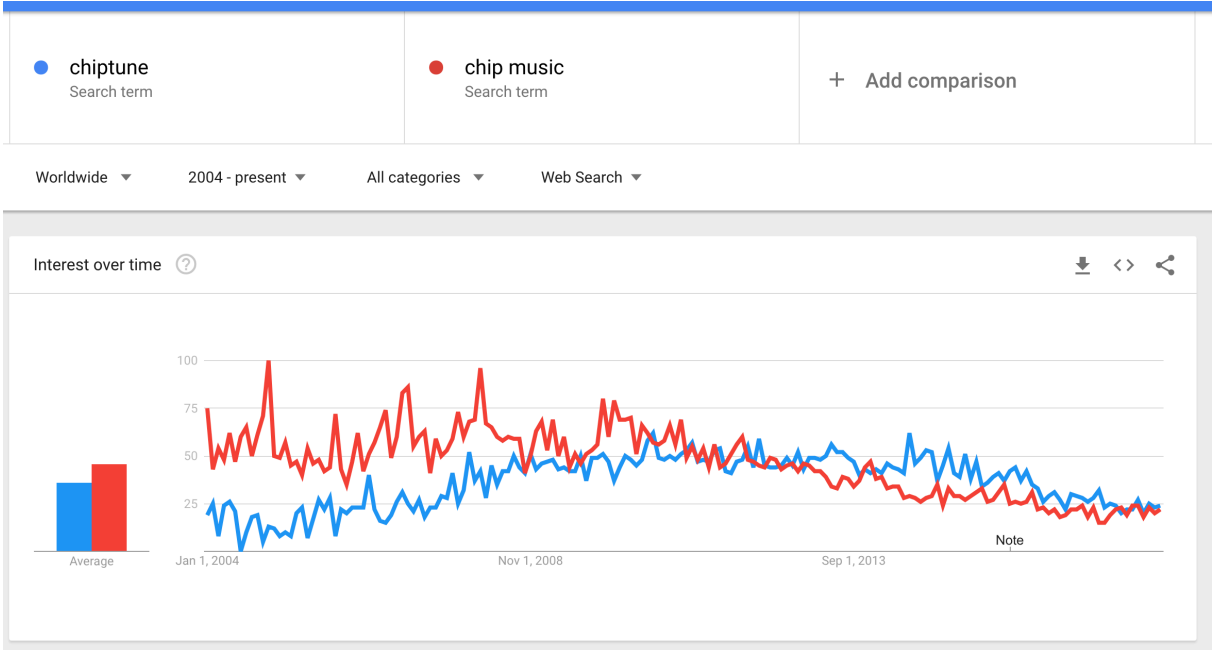
element of the genre. Not adapting techniques in such depth could in fact create a sensation of the arpeggio being a lacking imitation.

4.3 Discussing the Fourth Generation

Chiptune is still a medium, form and culture. It seems that by far the most important feature of a musician to be a chiptune artist is in the aspect of *culture*. Being part of the community is what typically makes you label your work chiptune. Carlsson (2015) makes a fair point about chiptune as culture. “A network of people in social platforms online, perhaps with a long history of making chipmusic, who now make other kinds of music but continue to hang out”. However, there are still new waves of artists that utilize the medium and form. However, the stage has changed quite a bit but new communities have made sure they are part of the chipscene and its history.

4.3.1 Community

Since 8bitcollective disappeared from the web in 2011 the community was scattered across different communication platforms. It has since been difficult to track down and put numbers on the community. Analyzing keywords on Google Trends however show that there was no sudden decline in interest for chiptune music.



Figur 8. Screen capture of analytics from Google Trends on the two common terms for chiptune music.

To me, being quite distanced from the real-life scene, it first felt as if the chipscene had disappeared along with 8bitcollective. I realized this was not the case. Some of the members had migrated its communication to other similar media repositories. Facebook groups were also becoming the platform of choice for members new and old. As of today, the Facebook group Chiptunes = WIN has 5695 members. Battle of the Bits has 8000 users.

It seems to me that interest in the chipscene should be separated from interest in individual artists and their music. The interest in artists that have backgrounds in the chipscene does not move in parallel with the interest in chiptune. It is important to remember that they wish to promote themselves and their music, not necessarily the equipment they use or the community they are involved with. Chiptune as culture is not as community focused as it was in the previous generations, however there is still a recognition for the chipscene when members meet in real life. Individuality seems to be a bigger focus today. Chiptunes = WIN and similar places are however popular places for gaining knowledge and getting your music showcased.

Chatrooms, especially on the communication platform Discord is a popular place for chiptune discussions. There are quite a few channels with focus on different aspects of chiptune music and culture. In these channels, it is easy to get in touch with people who are knowledgeable on different hardware and software for making chiptune. The use of discord seems to be rising in popularity. Alongside the groups, aesthetics are still being created through discussions of production techniques, events and music.

The statistics reflect what Carlsson (2014) describes as a *retromania* directing the mass culture towards the chiptune forums. Perhaps these statistics best reflect the activity of those deriving from this explosive attraction to 8-bit culture and perhaps these are whom Polymeropoulou (2014) describes as the third generation. It makes me curious how we best can describe this current movement. It seems that the fourth-generation community is more based around local communities, similarly to the first generation. However, it seems to interfere with mainstream culture in a completely different way, as opposed to being isolated from it.

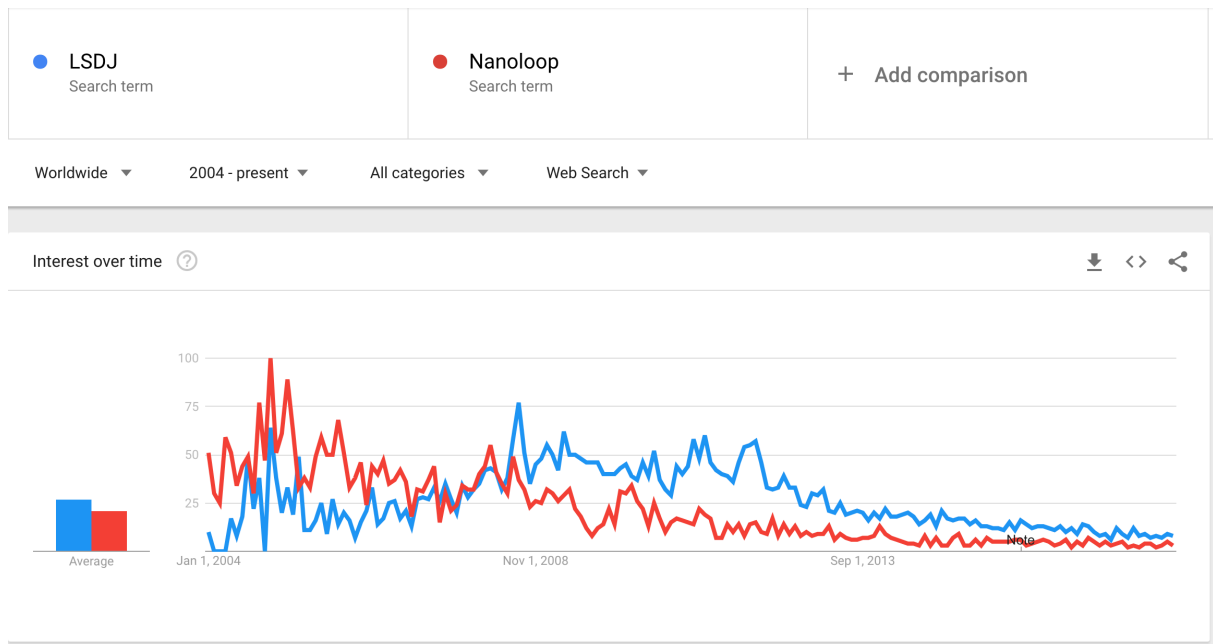
I have found that the competitive atmosphere has calmed down considerably in the chipscene, for better or worse. A lot of the communities have taken action to oppose the competitive mentality, perhaps as a result of negativity conveyed in the discourse for authenticity. While it still exists within communities such as chiptunes = win, where a selection of tracks to be

featured on their compilation albums are made by a panel of judges, there are no longer a weekly top 3. Battle of the Bits is the only place that brings a similar competitive spirit. However, it is rather spread across many competitions hosted by a website that puts emphasis on friendliness (Bookbinder 2016). Of course, competition is inevitable in music. It brings attention to the artists that are considered “good” and filters out those that could be “bad” without listeners having to state it in comment sections. Competition also makes it clear what brings aesthetic value within the music. How do we decide what aesthetics decide what is good chiptune and what is not. Attention seems more equally distributed among artists and there is a clear focus on diversity. Anyone can make chiptune, regardless of musical background or personality traits (Hood 2017).

4.3.2 Hardware

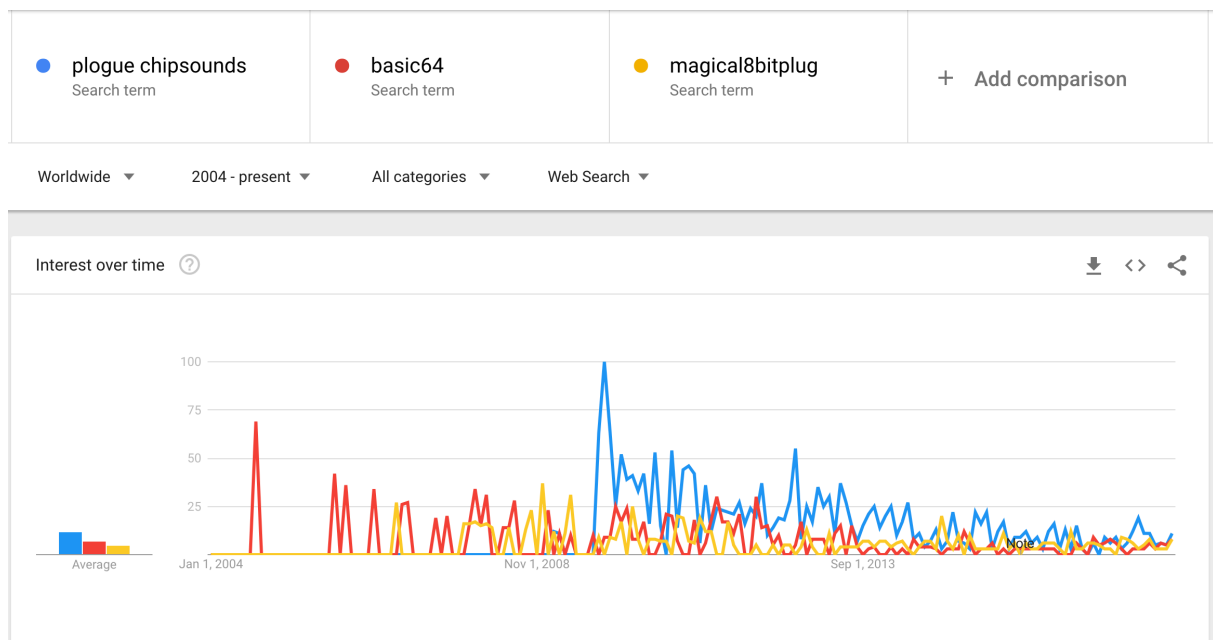
Gärder (2018) mentioned in his interview that most folks will not be able to distinguish between a NES and a Moog. I believe a well-informed ear is able to do this. Sometimes, the music is stained by audio artefacts of its hardware, like popping-sounds and white noise due to the equipment not really being optimized for music creation. Often these are processed or removed after recording the music from the hardware and sometimes they are reduced through making modifications to the console. The Pro-sound mod, pioneered by Timothy Lamb (Trash80), is an example of this that is still wildly popular for Game Boy musicians.

Since 8bitcollective disappeared there was a certain decline in google-searches for chiptune tools.



Figur 9. Screen capture of analytics from Google Trends on the two common Music sequencers for the Game Boy.

Does this tell us there are less new chiptune musicians utilizing hardware coming in to the scene today? There are still new names showing up in the compilation albums and newcomers asking questions in the different communication platforms. There is a chance the method of distributing hardware has been focused outside of google searches.



Figur 10. Screen capture of analytics from Google Trends on three of the most popular VST-instruments for sound chip emulation

4.3.3 Practice

Fact is, there was no longer a strict code of conduct. During my entrance to the scene, LSDJ music made on the Nintendo Game Boy was at its peak of popularity and a lot of knowledge was created around the software and hardware. The music created on this obsolete handheld console sounded rich, powerful, raw and unique, but the music created then pales to what has been made lately. In terms of tech-oriented aesthetics, many artists of the scene today have truly mastered the software. The forums are filled with detailed description of programming-techniques and discussions about technical aspects of the Game Boy.

As for emulation, chiptune sounds have appeared in many other subgenres and styles. However, they usually bring the same aesthetics of melodic pulse leads, arpeggios and basic waveforms. However, this is rarely labeled as chiptune. There is a clear division between this type of emulated chiptune and fakebit, where fakebit aims its music distribution towards the chipscene instead of acting as sole aesthetic compliment to the piece.

There has been a bridging between fakebit and hardware chiptune. Fakebit musicians are analyzing in depth the techniques of hardware chiptune and utilizing them in their programming. It is however debatable if this is a new phenomenon. It seems the new thing is that the de-escalation of the *discourse of authenticity* has made way for more open communication. There is a positive tone between the artists of different methods and they seem to influence each other. I believe the practice of chiptune can start to be more oriented on musical content. Limitations are still a big part of the practice. Musical content is often influenced by the limitations of these consoles. The next chapter will look into the aesthetics it creates.

4.3.4 Aesthetics

Since the 1980's, a decade which saw a dramatic acceleration in technological advance also in music creation, there seems to me like we've had a misconception about a certain concept. To give an idea of why Chiptune exist, or rather "still" exists, I think it is important that we first come to terms on this. I'm thinking of limitations. Not limitations in personal technique and musical ability, but rather the set of specific limitations in the equipment we use to write, record and produce our music. This is an aspect of music production that changed a lot when the polyphonic synthesizers first hit the market and digitalization of workstation and instruments started. Since this turn, design has often aimed to maximize its potential through

having more features and the ability to take many roles. After the introduction of sound chips in the 70's and digital audio processing the potential of these new tools seemed endless. They were only limited by the processing power and storage potential of the newest hardware. Introducing the most *powerful* tool to the market was of great interest to the companies and music producers consumed the bait eagerly.

Up until that point things were in a sense a lot simpler. Rock musicians were limited by their guitar not being able to sound like a trumpet, the Minimoog synthesizer was usually not able to create varied chord progression or recording engineers limited to four tracks on their reel to reel recording system. There are examples in all processes of music production. As music entered the era of digitalization we could suddenly fit a vast variety of sounds into a single piece of equipment. This is where I would call out some engineers as well as artists for making this misconception of limitations.

"Limitations are the key to creativity. With too much freedom you do not get anything done, whereas different rules and obstacles stimulate creativity. It does not have to be technical limitations but can also be about genre, aesthetics, the expected audience reception, deadlines, etc." Linus Åkesson (Carlsson 2010)

Chiptune is perhaps one of the greatest examples of this. In a sense, it proves that chiptune is a result of technology.

This theme has been agreed on by many producers I have talked with. Composers have limited themselves to create innovation in music many times throughout music history. In computer music, chiptune derives from the same philosophy. As Aupetitgendre (2018) reflects on limitations, he notes “in chip, and in electronic music, one of the main writing tools is sound design, I gravitated naturally more and more towards lsdj”. Sound design is an important aesthetic of electronic music it seems. It can be technical, or it can be simple, but it seems it can only be explained as such within a set of rules and limitations.

The luxury of our technological advance is not in eliminating as many limiting elements in our process as possible. It is not in having every sound in the world available to us or the option to write music of all styles and philosophies in one piece of equipment. Limitations fuel creativity. Yet some will seek the most powerful piece of software that will never limit them. Having the ability to actually choose your limitations is therefore what I believe to be the biggest advantage of writing music in the 21st century. To me, having a tiny keyboard that tries to do everything from “fat” synth bass sounds to “lush” grand piano sounds lack a

certain feel of authenticity for some reason. This is, as previously mentioned a very complicated subject, but I believe it could also be part of the chiptune aesthetic in a simpler fashion. I, just like many other creatives I've been in discussion with need to be triggered in a certain way by my process. Sometimes the music we listen to tells us a lot about how it is made. If you have a trained ear for it, you can tell whether or not the writing process attempted to emulate a different, oftentimes older process in a new format. For example, being able to recognize whether the piano on a song is recorded by a live pianist in a studio or programmed with MIDI³⁹ using a set of piano samples. Recently we seem to have come to a realization that, as far as technology has come today we can always be fooled and let's be real, if we are bothered by that piano chances are we are among the few, maybe some bit picky ones. Either way, it does something to the music that has aesthetic value. Hearing the pops and clicks that a real Game Boy would produce adds to the aesthetic.

What I think is important is that the composer was able to use his tools to create music he or she thinks is good and lets them convey their emotions and ideas through them. I think it is important to note that nostalgia is not necessarily the driving attraction to chip music and more and the retromania has ended. This is also clear in the google trends statistics above. In the words of Karen Collins, "many of the composers in the scene are too young to have spent childhoods with the machines. Rather, they like the challenge of the limitations ingrained in the technology" (Collins 2008). I believe this is where the origin of the chiptune aesthetic is found and still lives on. Aupetitgendre (2018) also reflects on nostalgia and says "I'm really excited for what's to come. What about people who will discover chipmusic through modern indie games?". There is something beyond the nostalgic relationship and technological background. The sounds simply have charm.

The aesthetic and sound of Chiptune seems deeply rooted in limitations given by the variety of computers used in the genre. The way I see it Chiptune is an extreme example on choosing a pre-designed set of limitations, but not necessarily limited to just that. The way it has evolved it is rather music inspired by these limitations and conveying this aesthetic through whichever limitations the composer wishes to set for him- or herself. The sound chips used may not be able to produce a convincing emulation of a string ensemble, but they are rather used as instruments of their own. The interesting question to me is whether or not a modern-day computer is able to produce a convincing emulation of the sound chip. And is there really

³⁹ MIDI: Musical Instrument Digital Interface. The industry standard protocol for communicating with electronic music equipment

any point in doing that? They come with quirks, inconvenience and limitations that a writer will have to work around or accept. They present technical challenges and a platform for virtuosity where the writer can look for the most efficient ways use what they have at hand. Because of this it is also creating a recognizable sonic character and bringing in, sometimes completely unique compositional elements. The computer emulation could reduce said limitations and still feature the charming timbres.

The aesthetic common ground for all processes in chiptune seems to be in context of “Lateral Thinking with Withered Technology” (“Kareta Gijutsu no Suihei Shikō”) based on discourse around the music. This is a concept created, ironically enough, by Gunpei Yokoi who worked as a video game designer for Nintendo. He is credited for the design of the Game Boy. (Mathis 2013) As explained by Mathis, “The basic idea is to use existing, cheap, well-established technology, and use it in new ways”. Even though this is originally used to describe a philosophy within video game development as well as other businesses it also describes the aesthetic of most chiptune ideologies. Especially if the “technology” represents not only the actual hardware but also the sounds deriving from them. It seems correct to interpret it this way considering the modern machines only would be a tool for lateral thinking. The sounds will still derive from or emulate withered technology. It seems to me that the fakebit musicians are those most worried about “authentic chiptune” today. It is a strange shift from complaints of purists to, perhaps, an insecurity in the fakebit user. I certainly have felt it this way, having witnessed the discourse in my confusion as I started out.

The data I have collected points towards Chiptune no longer being a genre, but perhaps it never was? And surely, that does not seem to be a bad thing. In fact, the term *genre* seems to be running out of fashion as reflected on by (Wong 2011). It can certainly not be identified in a traditional way of genre research. Chiptune is a culture. It has aesthetics, it has machines and it has humans. The machines present limitations that create aesthetics and the humans talk about them. If it ever was a genre, it was sustained by internal competitiveness that resulted in the discourse of authenticity. It seems to me though that this discourse was a result of a struggle to be accepted as a genre. Perhaps the chipscene has decided this is no longer necessary and rather celebrates the culture and social bonds that the music has created.

5 CONCLUSION

Let us look back at the hypotheses to conclude the thesis. If Polymeropoulou's generation is defined by the discourse of Authenticity, can we apply this to a fourth generation?

The fourth generation does not conduct this discourse to the same degree. They seem to agree that chiptune can be written through any process as long as it aims to use the chiptune aesthetics. We can certainly see chiptune divided into waves of ideologies, but it does not really seem like the discourse matters much today. Today, a chiptune artist can choose which aesthetics to use in his music.

Are we forced to look at chiptune, not as a genre, but rather a cultural phenomenon? Anders Carlsson argues "as for the performers and recorders in the chipscene, the technopurism that glued the scene together, for better or worse, is not there anymore". Chiptune today, even though its aesthetic is blurred by influences from other cultures, still has highly recognizable characteristic in timbre and recurring compositional elements. However, it plays by different rules than most other genres. Since the discourse on authenticity more or less disappeared, the most common argument used in the discourse has been along the lines of "do not bother discussing this, enjoy the music". It is a positive attitude towards the community and art but has certainly made researching the current state of the chipscene very complicated. I also believe it might restrict chiptune from being a defined genre. I believe we have to make a separation between the chipscene aesthetic and the aesthetic of its music.

If there are aesthetics and historical events that apply to the generations, can we define a fourth generation by aesthetics and historical events?

The aesthetic has become complex and vague since the release of Tomczak's paper in 2008. The rebellion still exists within the scene but is no longer as common of a reason for an artist to create chiptune. For those working on hardware, it seems to be more in context of intellectual challenge of limiting formats.

It is both the constraint and the appeal, if you want to write for chips, you have to consider a very limited workflow, but that aspect of challenge, musical or technical, is also what draws musicians to try it out. Technical showdown aspect, inherited by the demoscene (Aupetitgendre 2018)

Certainly, there are aesthetics in the fourth generation that have evolved through the history of chiptune music. Through tech-oriented processes and musical content deriving from limitations artists create aesthetics that influence all approaches to creating chiptune music. Historical events affect the culture, but there are less events relevant to chiptune being tackled by the scene. The greatest event must have been the disappearance of 8bitcollective which halted the discourse on authenticity online. It is however difficult to say what effect it may have had on the discourse in real life.

On a personal note, there is no doubt in my mind after this research that emulated chiptune is just as authentic chiptune as hardware chipmusic. Even when the term was first used, it was used to describe sample-based music mimicking the sound chip of PSG-soundchips on an Amiga. (Carlsson 2014) Emulation has apparently always been a part of the process. It seems to be a discussion stuck in the past of the elitism that occurred in the first and second generation, following the waves of mainstream misinformation that McLaren started.

I will end this thesis on a scientifically premature note. This research has been the nail in the coffin for my interest and quest for *authentic chiptune*. It has given me the knowledge to come to terms with the question I dedicated so much thought to. As an artist, I realize that I need not worry about authenticity because only I and a few people care about it. The only important perspective on authenticity in my work is my own. Those proclaiming understanding of my music with the purist ideology may not ever have understood the history of chiptune. I do however care about the aesthetics but see that we are free to choose what aesthetics to apply from chiptune. The community is the core of the genre and as long as it exists and is documented, chiptune will be considered a genre. I did initially have a wish to define chiptune as such, but I believe now that it is just as easy as trying to define the Laptop or maybe take it as far the guitar as a genre. But I mean... guitar music is a term, right? Regardless, the *genre* term seems to be old fashioned. With all respect to the chipscene, the work of Polymeropoulou and the Chiptune ID3 tag⁴⁰, I suggest chiptune as a genre is dead, and chiptune as form, medium and culture alive and well.

⁴⁰ ID3: Metadata included in an MP3 file containing information about title, artist, genre, etc.

BIBLIOGRAPHY

“gwEm” (2004). "Open Letter to Malcolm McLaren." Retrieved 21 April 2018, 2018, from http://micromusic.net/public_letter_gwEm.html.

Ali, R. (2013). Chiptune band Anamanaguchi on their lapsed connection to video games Orlando Weekly. Orlando, Michael Wagner.

Aupetitgendre, P. (2018). Advanced Tech in LSDJ. V. Kummen.

Aupetitgendre, P. (2018). Interview with Paul Aupetitgendre. V. Kummen.

Beardsley, M. C. (1970). The Aesthetic Point of View. New York, State University of New York Press.

Bookbinder, L. (2016). "Battle of the Bits Press Release."

Carlsson, A. (2008) CHIPMUSIC.

Carlsson, A. (2009). "The Forgotten Pioneers of Creative Hacking and Social Networking – Introducing the Demoscene." Re:live Media Art Histories 2009 conference proceedings: 16-20.

Carlsson, A. (2010). Malcolm McLaren made us. Chipflip. **2018**.

Carlsson, A. (2010). Power users and retro puppets - a critical study of the methods and motivations in chipmusic. Media and Communication Studies, Lund University. **Master's Degree: 57**.

Carlsson, A. (2012). My Presentation of 8-bit Users. Chipflip. **2018**.

Carlsson, A. (2014). Chip Folk Music. Chipflip. **2018**.

Carlsson, A. (2014). Wider Screen: Authenticity in Chipmusic. Chipflip.

Carlsson, A. (2015). A retrospective on the stories and aesthetics of 8-bit music. Chipflip. **2018**.

Carlsson, A. (2015). What's Chipmusic in 2015?

Carlsson, A. (2017). 1989 Appearance of the Chip Music Term. Chipflip. **2018**.

Collins, K. (2008). "In the Loop: Creativity and Constraint in 8-bit Video Game Audio." twentieth-century Music **4**(2): 209-227.

Collins-Dowden, M. (2016). LSDJ Tutorial - Noise Channel Percussion.

Dittbrenner, N. (2007). Soundchip-Musik : Computer- und Videospielemusik von 1977-1994, Osnabrück : Electronic Publishing.

- Fornäs, J. (1995). Cultural Theory & Late Modernity. London, Sage.
- Galuszka, P. (2012). "Netlabels and democratization of the recording industry." First Monday **17**.
- Gärder, T. (2018). Private Message interview with Rymdkraft. V. Kummen.
- GASHISOFT. "GXSCC Home Page." Retrieved 28 March 2018, from <http://www.geocities.co.jp/SiliconValley-SanJose/8700/P/GXSCCB127/indexEn.htm>.
- Hood, B. (2017). What *IS* Chiptune? Chiptunes = WIN. **2018**.
- Hood, E. (2013). Chiptune / Visualist / VGM / Nerdcore Map of the World! Google Maps: This map is a record of Chiptune artists, Visualists, Nerdcore and Chip Hop performers, and Video Game Music creators around the world. I know this map is not complete, my hope is that with community help it will become more so. .
- Houston, N. (2016). We are all Hackers. TED Talks.
- Kotlinski, J. (2017) Little Sound Dj v5.8.4 Operating Manual. 76
- Kvale, S. (1996). InterViews: An Introduction to Qualitative Research Interviewing. California, SAGE Publications.
- Mathis, L. (2013). Lateral Thinking with Withered Technology. Ignore the Code.
- McLaren, M. (2003). 8-BIT PUNK. Wired.
- Menotti Gonring, G. (2009). "Executable Cinema: Demos, Screensavers and Videogames as Audiovisual Formats." Re: live: Media Art Histories 2009 Conference Proceedings: 109-113.
- Mon, W. (2018). Game Boy sound comparsion (better than Herbert Weixelbaum's version). aquelex.ws. **2018**.
- Nisperos, J. (2012). CHIBI-TECH - MOE MOE KYUNSTEP. Chipmusic.org.
- Paul, L. J. (2014). For the Love of Chiptune. The Oxford Handbook of Interactive Audio. K. Collins, B. Kapralos and H. Tessler. New York, Oxford University Press, 2014.
- Polymeropoulou, M. (2014) Chipmusic, Fakebit and the Discourse of Authenticity in the Chipscene.
- Primate, J. (2013). MARIO AT A RAVE: THE LEGEND CONTINUES [ANAMANAGUCHI EDITION VOL 6].
- Reunanen, M. and A. Silvast (2009). "Demoscene Platforms: A Case Study on the Adoption of Home Computers."

Tomczak, S. (2008). AUTHENTICITY AND EMULATION: CHIPTUNE IN THE EARLY TWENTY-FIRST CENTURY. International Computer Music Conference (2008 : Belfast, Northern Ireland). Belfast, Northern Ireland, Queens University: 4.

Tomczak, S. (2011). On the Development of an Interface Framework in Chipmusic: Theoretical Context, Case Studies and Creative Outcomes. Elder Conservatorium of Music, Faculty of Humanities and Social Sciences. Adelaide, The University of Adelaide College. **Ph.D.**

Trinh, P. (2013). Anamanaguchi - Endless Fantasy.

Voois, V. (2014). Renoise 3.1 User Manual.

Weisethaunet, H. and U. Lindberg (2010). "Authenticity Revisited: The Rock Critic and the Changing Real." Popular Music and Society: 465-485.

Wong, J. (2011). Masters of Media: New Media & Digital Culture M.A. Amsterdam, University of Amsterdam. **2018**.

Wreen, M. (2014). Beardsley's Aesthetics. The Stanford Encyclopedia of Philosophy. E. N. Zalta, Metaphysics Research Lab, Stanford University.

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