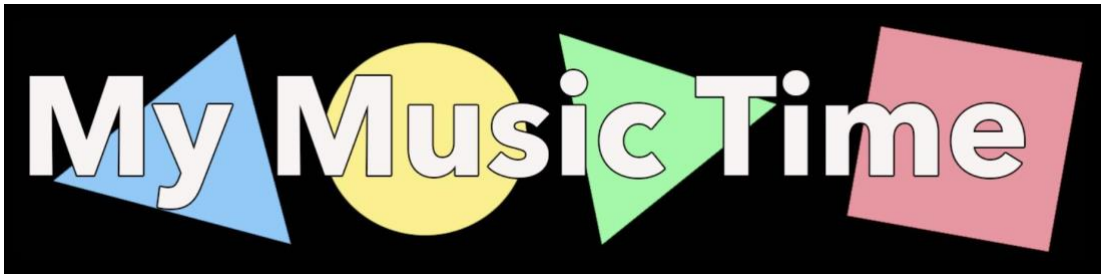

My Music Time: Emotional Well-being Through Musical Play

by

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Autism; Children's Applications; Design Thinking; Emotions; Emotional Recognition; Educational Technology; Interactive Music-Making; Interaction Design; Mobile Applications; Music; Music Technology; *My Music Time*; Self-Expression; User Design; Wellbeing.

Abstract

Music is a ubiquitous feature of everyday life; we soundtrack a range of activities from mundane tasks like shopping through to significant events like our wedding day. We have a deeply emotional connection to music across cultures, and music is highly influential in shaping emotions. Interacting with music has also shown to have excellent health and wellness benefits to participants and consumers alike.

This creative practice exegesis explores interactive music-making and, specifically, designing an interactive online application that aims to assist with emotional regulation and recognition while measuring how participants interacted with the application. Of particular interest was whether school-aged children would report a change in perceived mood and identifying patterns of interaction with the different musical elements. I utilised an overarching design thinking methodology to create this online application, supported by specific practical design frameworks for children and modern UX/UI design. This was underpinned by theories relating to the effect of music on emotions from research in music studies, psychology and commensurate disciplines, which all espouse the wellbeing benefits of musical interaction.

User data showed that most users (69%) reported a positive effect on their emotional state after interacting with the application, confirming current theories about the interaction with music and its role in supporting well-being. Further to this, through specific literature based on design principles for children, the project utilised interaction design and demonstrated effective engagement with its target group. Therefore, there is potential for further exploration and development of interactive platforms to engage with emotional wellbeing and mental health.

The significance of my project is the amalgamation of the theories of music and emotion and the practical design of an application that enables an interactive experience that supports emotional regulation and wellbeing and contributes to the understanding of innovative research in music and interactive technology.

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Statement of Authenticity

The original work contained herein is that of Johannes Dreyer and has not previously been submitted for an award at any other higher education institution. To the best of my knowledge and belief, no material previously published or written by another person has been included except where due reference is made in the exegesis.

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Johannes Dreyer
October 2020

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Introduction

> …music possesses the power of producing an effect on the character of the soul. (Aristotle, Politics)

When we go to the gym, we are likely to listen to high energy dance music as it motivates and energises us, encouraging our bodies to move. By contrast, when we sit down to dinner, we are more likely to select something calming and unobtrusive. Lullabies put infants to sleep, work songs help ease the burden of repetitious physical labour, and marches conjure bravery in preparation for war. Music is used to influence consumer spending in shopping malls (North & Hargreaves, 1997) and curtail street violence and criminal behaviour (Hirsch, 2012). Indeed, we use many practical ways to use music in our everyday lives because we are acutely aware of its capacity to shape our experiences and behaviours.

The deep connection between music and human emotion is a well-researched topic that spans academic disciplines and research paradigms. According to music sociologist Tia DeNora, "music has organizational properties. It may serve as a resource in daily life, and it may be understood to have social 'powers' in relation to human social being" (DeNora, 2004, p. 151). Music technologist Jacek Grekow states, "emotions are a dominant element in music, and they are the reason people listen to music so often" (Grekow, 2018, p. 7). Patrick Juslin states, "emotions—just like pieces of music—are dynamic processes. They unfold, linger, and then dissipate over time." (Juslin, 2019, p. 46).

While my Graduate Project makes use of and aims to contribute to the interdisciplinary field of music and emotional research, the true impetus to pursue knowledge and make a creative contribution to this area is my beautiful ten-year-old stepdaughter, Sufjan. She has been diagnosed with Autism Spectrum Disorder (ASD), and consequently, as is the case with many neurodivergent people who share a similar diagnosis, Sufjan lives with sonic hypersensitivity (Hughes, 2015).

In observing Sufjan and her neurotypical friends, I was fascinated to note the differences concerning her aural perceptions, the range of hearing and the emotional affect music has upon her. Our morning breakfast rituals methodically organised around

warnings for the use of the blender and coffee machine. We've managed several movie nights due to soundtracks being a bit too 'scary' for her.

As a music producer, DJ, and educator, I have been developing and teaching music production and audio engineering courses. In the last five years, I have had the privilege of mentoring special needs students diagnosed with ASD, Tourette's Cerebral Palsy and Down Syndrome. Working within disabilities is not a field that I sought out purposefully at first, but I continue to find myself presented with these mentoring opportunities.

This project draws from both my professional skillset and personal experience. Professionally, I bring a sophisticated understanding of music production in combination with my professional experience as a lecturer and a mentor. Personally, and perhaps more importantly, my intimate lived experience is central to both the motivation and outcomes that I have generated. My empathetic understanding through my every day lived-experience and professional experience has been foundational as heuristic observations guiding my decision-making throughout the design process.

Even though my autistic daughter inspired this project, and there are sparse references to ASD-related literature on music and emotion, ASD is not a specific focus of this project. The goal of this project was to design and develop an interactive music creation application that can serve as a wellbeing tool and possibly assist with emotional recognition. Therefore, my research is informed by interdisciplinary literature on music and emotion. The application aims to be wide-reaching and beneficial for both neurotypical and neurodivergent children.

Methodology

The creative output of my research is *My Music Time*, a browser-based application providing users with an interactive musical experience by allowing them to create music and prompting user reflection on emotional wellbeing in the process.

In developing the creative component, I engaged with scholarly literature from neuro-psychology and the interdisciplinary field of music psychology—a subset of musicology and psychology. I also investigated literature to develop the design framework, including interaction and response to design aspects and functional elements also known as UX (User Experience) and UI (User Interaction) related explicitly to children. I will discuss this research in detail in the Literature Review chapter that follows.

Through specific user interaction workflow, I established whether users experienced an emotional change through their interaction with the app. I analysed the post-experience reflection of users through data captured anonymously within the administration portal of the website. This data became the basis for the Findings and Final Reflection sections of this document. A detailed discussion of the ethical implications of conducting user testing and gathering user data is provided at the end of this chapter.

As mentioned earlier, my personal experience inspired this project, and as such, my initial approach to the design was primarily heuristic. After observing Sufjan's struggles with emotional regulation and noticing the lack of tools that could assist with emotional recognition, I was able to define the problem that I address in this research.

To solve this problem, I employed design thinking. "Design thinking is a design methodology that provides solution-based approaches to solving problems" (Dam & Siang, 2019). Figure 1 shows the original design thinking model popularised by Stanford d. school. In this model, each stage shows a follow on from the previous step, forming a robust framework that generates focussed solutions to ill-defined problems. This process can include multiple iterations of ideation, prototyping and testing before deciding on a final product.

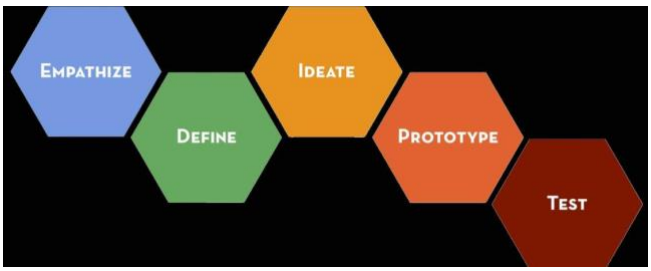


Figure 1. The Stanford Design Thinking Framework.

Stanford d.school. (2017). Design Thinking [Image] retrieved from https://medium.com/@philmichaels/5-components-to-design-thinking-by-stanford-d-school-48dd111bbbe5

The discrete stages of design thinking, as applied herein, are summarised as follows:

EMPATHISE	Understanding the experience of the end-user through observation and immersion.
DEFINE	Defining the problem or outcome your design will address.
IDEATE	Generating a large and wide variety of diversely possible solutions.
PROTOTYPE	Transforming your ideas into a tangible product, allowing for interactive exploration.
TEST	Testing products. Refining your original idea using observations and feedback, learning more about user interaction.

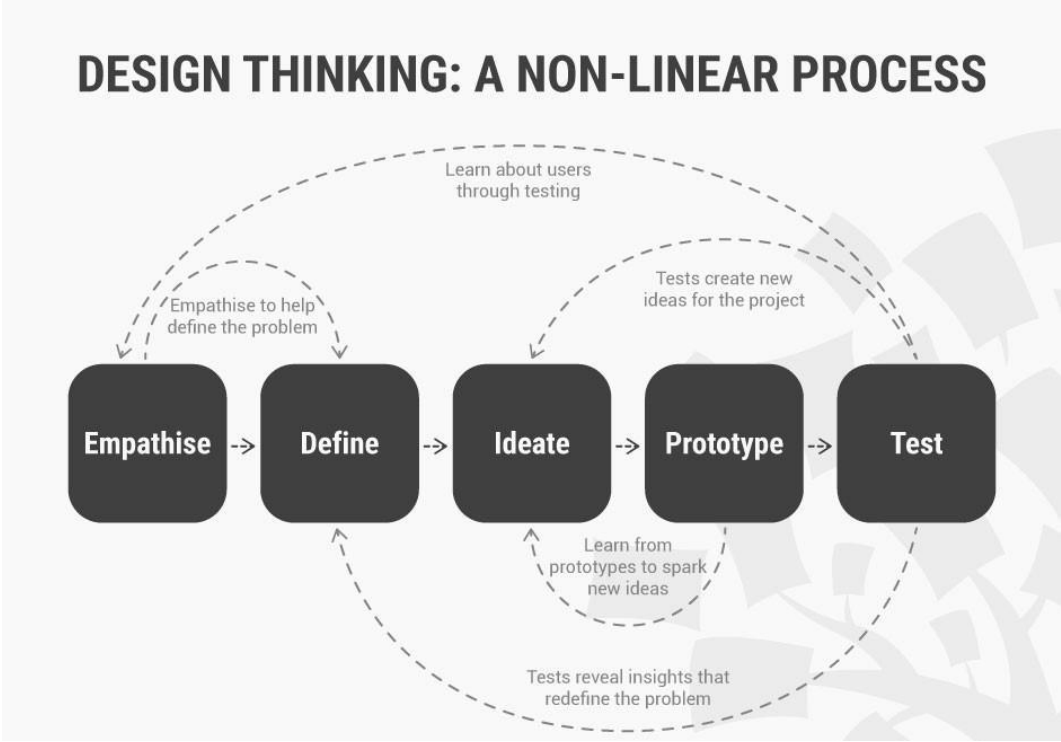


Figure 2. Non-Linear Design thinking process

Interaction Design Foundation. (2020). Design Thinking: A non-linear process [image]. Retrieved from: https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process

As shown in Figure 2, design thinking also allows for a non-linear process, which more closely represents how I utilised design thinking as a methodology. As mentioned earlier, I took a more heuristic approach to the empathising stage and before systematically approaching the defining and ideation stage, I had already undertaken

some initial prototyping. These prototypes helped me understand the way my target market engaged with interactive music-making. I created a prototype session that consisted of audio loops within an Ableton Live session triggered by an Ableton Push 2 controller and then observing how children interacted with this type of loopable performance platform.

Christine Miller (2014, p. 75) states that design research is dependent on "naturalistic enquiry" and "ethnographic style research", leading the design process broader than just aesthetics and in closer, more intimate contact with users for usability testing and research. During a family gathering, I asked four girls (cousins) to have a play and tell me what they thought of the experience. Their ages varied between 7-11; they were engaged but were very distracted by the complexity of the midi controller (Ableton Push 2) and the remaining buttons that were not assigned to sounds. I had to remind them to only interact with the coloured buttons, and this led to the first refining phase of focussing on a tablet application. I started researching the use of MAX MSP to build my application but had an idea of utilising HTML and building the application into a website.

I progressed and refined the project by employing cyclical stages backwards and forwards using design thinking. Refining cycles included the alteration of colour schemes, modifying the emoji characters, placement of icons to assist with a clearer interface and design, as well as introducing the classification of age to help optimise my database for reporting. This is detailed in the Design Process chapter herein.

As part of my ideation process, I based the first musical iteration on the principle that I would employ the same instruments for each emotion and only through signal processing would I be able to create the differentiating timbre required. This created quite a challenge, and the music wasn't inspiring. I quickly realised that I would need to draw from different pallets of sound (see Appendix B for examples). This and similar artistic considerations detailed in the Creative Process chapter of this document.

I classify the creative aspects of my project into design and composition. In the design stage, I investigated user interaction and design, specific design principles for children and the platform of HTML programming. In the composition stage, I focused on creating a cohesive overall sound that allowed the user to combine different emotions while introducing them to my contemporary production aesthetics. The application platform enables users to improvise musical performances that explore and combine four primary emotional states; Happy, Sad, Nervous and Angry.

As a musician and producer, I always explore music and technology within the audio production domain, and this informed my approach to creating the interface and platform for creative performance. As an educator, I hoped that this tool could assist children with emotional well-being and be used as a creative play device.

I utilised the services of an HTML programmer to help me create a web-based application. I presented the musical elements in a 'loopable' format, and the user was able to launch and stop the different musical elements at any time. The emotion, on the other hand, was restricted to a single emotion per musical element. This approach allowed the user to isolate a specific emotion in the hope that they could create more complex emotional journeys through their interaction.

During my final user testing phase, I shared the application via my social media networks to gather anonymised user data to ascertain the impact of musical engagement upon the end-user's emotional state. As user testing involved children, it was essential to ensure that this complied with the ethical conduct of research involving human subjects. This will be discussed in the following section.

Ethical considerations

When conducting research that involves human subjects, research must be conducted ethically, this is especially important when those subjects are part of a 'vulnerable' social group such as children, and this was the case with this project. According to the *National Statement on Ethical Conduct in Human Research*, "[t]he circumstances in which the research is conducted should provide for the child or young person's safety, emotional and psychological security, and wellbeing" (2018, p. 66). Christine Miller (2014) adds how designers primarily focus on the end-user and the "social context into which their designs are introduced" (p. 68). Miller also mentions how "designers have clearly articulated ethical concerns that reflect changes in the field over time" (p. 65); finally, the *Children's Design Guide* reminds us about the privacy and data protection children deserve:

> "Help me keep control over my data by giving me choices about what data to share, for what purpose and let me know how my data is used. Do not take any more than you need, and do not monetize my personal data or give it to other people. Care about me by respecting my data." (Children's design guide, n.d., Key principles 1.3, Section 5.)

This project implemented ethical considerations from two main frameworks: the *National Statement on Ethical Conduct in Human Research* (2018) and the *Children's Design Guide* (2018), with further supporting considerations from academic literature. As per these frameworks, the degree of risk for participation in this research project evaluated as low to no risk. This evaluation is justifiable because popular literature in the field of music psychology (see Literature review) established musical activity as not only safe but positive in terms of wellbeing. Furthermore, after the privacy, anonymity and informed consent were addressed using the frameworks mentioned above, the risk deemed as insignificant. Specifically, children were allowed to direct the interaction and their participation and were able to opt-out (the app able to be switched off). Participants could also choose not to share data by exiting the app. there was no need for responses to personal preference, and no personal identification captured.

Informed consent was provided by parents via a Facebook post from where I shared the app. The parents informed of the purpose of the research, with no monetary payments or rewards offered. All parents were fully aware that this was a masters project and that I would use the feedback to improve the application and inform my research. Also, according to the *National Statement on Ethical Conduct in Human Research* (2018), there was no reason to believe that "participation was contrary to a child's or young person's best interest" (p. 67). The project aligned more with the "emotional and psychological security, and wellbeing" (p. 66) beneficence guidelines set out in the statement.

By using the apparatus of Facebook as a means of engaging users, I relied upon its Terms of Service to ensure that my application would only reach my intended user group through a parent or guardian. As stipulated in its Terms of Service, Facebook prevents accounts from being created by users under the age of 13 (Facebook, 2019). The application was shared via my personal Facebook page and subsequently shared 27 times. Additionally, this was shared by my partner, as most of her network had children in the age range of my target group. This process manifests a scenario where the parents would act as gatekeepers, provide informed consent, sharing the application with their children with complete knowledge regarding the intentions of the application and how I

will use the data. I also saw this as an added opportunity to gain more insight into the design aspect and user interaction of a group broader than my projects initial focus. The interaction and evaluation discussed in more detail in the Findings section.

The anonymous data collected is compliant with *The Australian Privacy Principles* detailed in the *Privacy Act (1988)* and included the participant's age range, a visual representation of their interaction. That is, which loops were launched over time, their reflection on their feeling post the experience (better, worse or same) and a timestamp. Information that was gathered together with the application purpose, as well as the privacy statement, was shared on the Landing page (fig. 3), and the full privacy policy included in this document as Appendix C

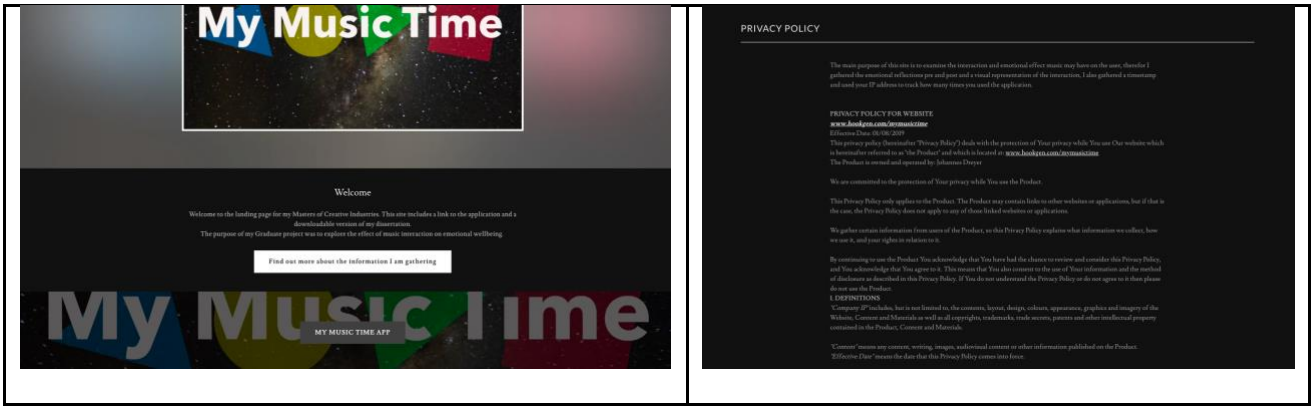


Figure 3. The landing page with a link to privacy policy and specific information

Literature Review

> Music is an essential part of being human, with important status from the earliest stages of life. For example, singing is more effective than speech at holding an infant's attention. (Swaminathan, 2015)

The purpose of this chapter is to situate the creative project within the relevant scholarly literature and establish the design principles upon which the app was developed. This chapter is organised into two sections. The first section represents the main domains of knowledge relevant to my creative goals, and the second section outlines the design principles for my application.

My research engaged with scholarly literature from various disciplines, including the interdisciplinary field of music psychology (DeNora, Davidson, Crause) —a subset of musicology and psychology—framing the leading research regarding cognitive and emotional responses to music. I also referenced specific neurological research that supports the physiology of the human brain/mind and how that relates to emotional response (Levitin, Schneck, Berger). After establishing the emotional connection with music, I focus on the design framework, interaction and response to design aspects and functional elements, also known as UX (User Experience) and UI (User Interaction), as it relates explicitly to children.

Music and emotions

While some researchers claim that music predates speech (for example, Schneck & Berger, 2005), explaining why music seems so hardwired within our physiological and neurological existence, others (for example, Levitin, 2006) identify the profound emotional effect music can have on its listeners. After reflecting on these ideas, it left me wondering how music can affect us on both a physiological and psychological level?

I believe that music and its emotional connection are entrenched in all cultural experiences and have several direct links to significant personal and cultural events. Schneck & Berger (2005) recognised the historical impact and profound psychological effect invoked by music by noting how "the Greeks believed achievement within the arts or sciences were divinely inspired" (p. 22). They continue to mention how etymologically, music is the only English word that has maintained its identity from its

original context (Schneck & Berger, 2005). Schneck & Berger (2005) continues by stating, “the history of music in the human experience is at least as old as our civilised past and probably older” (p. 22). They are solidifying my interest in the impacts of music throughout history and particularly for the ancient people of Greece. In terms of the physiological effects of music, Schneck & Berger (2005) observe that music provides a means of communicating through syntax that we as humans understand and respond to profoundly. They argue that music and the body share a unique symbiotic relationship independent of cognition. Music enters the listener’s subconscious through primal and emotional pathways that “does not require any type of semantic interpretation” (Schneck & Berger, 2005, p. 30), nor linguistic familiarity. "Music communicates with the body by speaking the language of physiology” (Schneck & Berger, 2005, p. 24), and studies using physiological measures confirm that music listening is associated with emotional arousal (Swaminathan & Schellenberg, 2015). This observation suggests that a music app could provide a direct connection to a user's emotional state with minimal explanation necessary.

Music has and will continue to have a profound well-being impact on us regardless of our cultural background or history (Sunderland et al., 2018; Radocy et al., 2012). The emotional affect seems to be broader than just personal preference and thus acts as a foundational element of my research and project. Jane Davidson and Amanda Krause (2018) remind us that listening or playing music can have a positive role to play in everyday wellbeing, and Dingle et al. (2016) observe that music programs are employed for “psycho-education and skills-building”. (p. 2) Through building *My Music Time*, I aspired to create a fun, intuitive and accessible way for children to engage with music and to affect their wellbeing positively.

Paul Farnsworth was a pioneering social psychologist and the first to explore music and behaviour in his text *The Social Psychology of Music* (Farnsworth 1958, 1969). It is worth noting that the discipline of psychology has been interested in music for over 60 years, and even though the terms “well-being” and “health” were not a part of the discourse, it correlates with social wellbeing (Davidson & Krause, 2018). Well-being and creativity are a fundamental part of a balanced life for all children (MacDonald et al., 2002; Bunt, 2012).

Music is understood to enhance wellbeing in a myriad of ways. Jane Davidson and Amanda Krause claim “making music exerts considerable demands on the human central nervous system as it interactively engages memory and motor skills (2018, p.

34). Clarke, DeNora and Vuoskoski (2015) explore the capacity of music to promote empathy through a broad range of human sciences frameworks and setting cognitive empathy within several different neurological functions that assist with social wellbeing.

As humans are social creatures, we have an innate need to communicate feelings, share emotions and interact with our tribe. According to some Darwinian theorists, this is where music and dance started (Nadel, S., & Baker, T. 1930). "Music could be defined as a receptacle into which one's feelings are placed in order that one may reveal one's self to one's self as well as to others" (Schneck & Berger, 2005, p. 248). I see great value in this definition, that music is, in fact, a personal interaction with one's self, where the observed feelings of euphoria and self-worth from the creative output becomes the primary driving force for humans to continue the cycle of evolution through creation.

Beyond the general challenge of defining emotions and responses to music, a more specific challenge I faced was the Contrast effect, a phenomenon that could impact emotional response to music. Schellenberg et al. (2012) note that the emotional context of music is evaluated and will be influenced or fluctuate depending on the accompanying music. Another factor that added to the complexity of this subject was Contrastive Valence—a mismatch of musical prediction and outcome. If a positive event is expected, a negative result can be overly unpleasant. Additionally, research shows that a person in a sad state of mind prefers sad music over happy music as they can relate to the aesthetic that matches their mood (Schellenberg et al., 2012). These phenomena became considerations during the design and reflective process of my research.

It has also been observed that 'emotional responses to art differ from responses to other stimuli because they occur on two levels: one related to the emotion expressed by the work of art, the other to the perceiver's evaluation' (Bhatara et al., 2010, p. 42). It is almost impossible to determine how any art form will be received, as every person will have a unique experience when interacting with it.

All these challenges noted and considered during my research. Through this, I decided to create a measurement where the user reflects on the change, if any, to their emotional state before the interaction. This serves to identify a consequence or result after the interaction rather than attempting to identify an emotional state.

Design principles

As the UX/UI design elements formed a significant part of my project, understanding how to design for children became my next focus.

Sonia Chiasson and Carl Gutwin (2005) remind us that children have different goals; they possess a wide range of skills and abilities and have been exposed to technology from an early age. Their needs and goals cannot be met by adult tools that are scaled down to cater for children. Designers need to focus on engaging these younger users through well thought out features and mechanics as the value will be attained when their attention is maintained for longer durations. For products aimed at "education or entertainment, user motivation and engagement are as important as task efficiency" (Chiasson & Gutwin, 2005, p. 1). Chiasson and Gutwin suggest an interface design framework made up of a clear set of design principles based on cognitive, physical, and social or emotional stages of the child's development.

Several studies, including *SearchKids* (Druin et al., 2001), have shown that text-based interfaces are insufficient for conveying information to younger users and that much more remarkable success is achieved through graphical interfaces. The use of graphically represented, content specific metaphors allowed children to navigate large information spaces with ease and accuracy. This will, however, only be valuable if the information presented is clear and age-appropriate.

As my application focuses on multiple interactions, these frameworks have been vital for the creation of a successful and engaging application. Music is not enough to engage these users; ease of interaction and maintaining attention through excitement are things that I have observed as crucial for my focus group.

Margaret Tan and Neha Khetrapal (2016) propose a specific framework that relies on a combination of music and images, resulting in emotional awareness instead of the traditional picture and text resulting in emotional recognition. This framework is in line with my project, as I opted to use images and sound for the process of discovering emotional awareness.

During their research, Tan and Khetrapal explore the biological and neurological healing and synchronising features of music. They explain how infants are "from early on, confronted with the task of making sense of auditory stimuli that enters their cognitive system" (2016, p. 470). Initially distinguishing between speech and non-

speech, followed by differentiating vowels and consonants and finally words and meanings. Parallel to this, emotions follow a developmental course that starts by interpreting emotions from music and tone (Tan & Khetrapal, 2016). This suggests that the "inference of emotion, at early stages, occur in a pre-linguistic manner where these emotions are devoid of language labels" (2016, p. 470). Still, it is also worth noting that these emotional associations with music may be culturally biased. Swathi Swaminathan and E. Glenn Schellenberg (2015) also add that before cultural-specific cues, young children can use general acoustic cues for emotional musical judgements. As this project is based on a western musical framework and there is an acknowledged cultural context for this work, users from different cultural backgrounds may not experience the emotions in the way that the music is intended to represent them. However, in these instances, I remain hopeful that a simple musical interaction could still provide a well-being experience and creative output for these children.

On a biological level, music possesses 'healing' features that assist the neurons in the brain to more effectively and synchronously communicate (Thaut cited in Tan & Khetrapal, 2016, p. 470). Moreover, it is a well-researched phenomenon that music has a neurological effect on the listener and that it could synchronise neurons and assist with learning (Schon & Tillmann, 2015).

Daniel Schneck and Dorita Berger (2005) establish that it is entirely feasible to propose that musical elements can communicate with the body's genetic system, citing the secretion of opioids and the physiological effect that results from listening to your favourite music. When studying choral performers, researchers found that their post-rehearsal immune systems indicated an improved ability to fight off diseases. It seems justifiable that one can use music to enable a state of wellbeing and emotional regulation.

To complete Tan and Khetrapal's framework, I explored the *Picture Exchange Communication System* (PECS) framework of (Charlop-Christy et al., 2002). I used emojis as the platform for my images. I chose Emojis to overcome linguistic challenges and to be more likely to engage younger children, the leading target group for my application.

Tan and Khetrapal's (2016) framework is a rehabilitative framework that incorporates music. Their study is more focused on autistic participants as they crave emotional experience and the authors feel music is the best way to do that as opposed to

images. Part of my research was to build on this framework and test whether music can assist school-aged children with an emotional recognition experience.

As the links between music and emotion have been firmly established, let us now consider music in the context of design, specifically how my design framework accommodated four key elements of music. For this project, I followed Schneck and Berger's (2005) definition of music as "a specific combination of sound attributes, as embedded in what some traditionally considered to be the six elements of music: rhythm, melody, harmony, timbre, dynamics, and form" (Schneck & Berger, 2005, p. 31).

To simplify the framework, I incorporated dynamics and form as overarching foundational attributes, leaving the focus on the remaining four elements to create a more focussed and manageable set of measurement tools. I did, however, replace harmony with bass, incorporating harmony into the melodic category and separating bass, which usually is included in the rhythmic category. The reason for these alterations was to follow a more traditional music production workflow and mimic elements of live performance, as well as to create a visually pleasing and design-centric interface. A discussion and analysis of the musical elements and how they were designed is discussed in more detail in the Creative Process – Music section.

When embarking on my interface design, I used Chiasson and Gutwin's (2005) catalogue of design principles to identify some elements which I felt explicitly related to my project. I first considered user feedback. Children expect immediate feedback and results from any interactions with technology - I have witnessed how quickly children get frustrated if nothing happens after a first click or swipe. They also need to be able to navigate and understand the workflows without much learning. The interaction required to be as intuitive as possible or guide the user through feedback while considering the abilities and expectations of these younger users. Chiasson and Gutwin state that the representation of familiar items can guide younger users, using, for example, 3-D appearances for buttons or a stop sign to halt the action. Similarly, the audio needs to be responsive to allow for direct feedback after the interaction (2005).

Imagination was the second consideration. Typically, children tend to immerse themselves in their environment through their imaginations. This can lead to a disjunct between what children imagine is possible within a game-based application and what the designer is able to deliver practically. Maintaining the user's attention and interaction can be particularly challenging for novice designers with limited skill.

Chiasson and Gutwin also remind us to be careful when using metaphors as children are likely to "immerse themselves" in their environment, and this could lead to expectations that "exceed the interface" (2005, p. 4).

As younger users may have difficulty with abstract concepts, mental development was the next consideration. We can see in Druin et al.'s work with *SearchKids* (2001) that children process and organise information in different ways depending on their stage of development. They also do not possess the in-depth knowledge to be able to navigate complex interfaces, which brings us back to the use of graphical interfaces and image-led navigation systems.

Lastly, I considered the physical development of the users. Tasks like drag-and-drop or mouse clicking for extended periods may be difficult depending on the level of motor skills the users have. It was, therefore, crucial to consider this when designing for age-specific or non-neurotypical users. Consideration of these features can lead to higher levels of engagement as users are more motivated by the ease of the functionality.

With the *2017 Gallup World Poll* data indicating that 93% of adults in high-income economies and 79% in developing economies have mobile phones (Demirgüç-Kunt et al. 2018), positioning my application as a web-based program seemed like a logical and most accessible platform. This should allow for internet access via mobile service providers and would include *cookies* that could allow for offline interaction without internet access. Designing for a web-based application will also allow users to access the app on different platforms and devices. Crucial to my future considerations for accessibility, Wendy Magee (2016) confirms that the developments in electronic assistive technologies have created a platform to enable people with severe and complex disabilities to be able to communicate and control their environments which will inevitably change the landscape for support, health and social care professionals.

I acknowledge that there are very close links between my research within this project and music therapy. Still, for reasons of disciplinarity and a lack of personal qualifications, this project should not be viewed as a clinical therapy tool.

When I started planning this project and the research, I knew that I wanted to approach my research topic from an interactive foundation, with music as the primary catalyst for wellbeing. My project differs from other tools and applications I have found (detailed in the following section) as it allows for interaction and freedom to express

several different emotional musical ideas while measuring the reflection of the interaction. I believe that ultimately this app could be further developed to become a more robust measurement tool for clinical practitioners as well as expanding on the user experience through continuous improvement and revision.

Design Process

With design thinking as my methodology, I utilised UX/UI and design principles for children to begin the process of creating my application.

The first step in the process of design thinking is empathy. This is achieved through the development of a personal and deep understanding of one's target market and particularly how a product or service can assist and enhance their lives. Traditionally this is done through a process called a 'persona chart', where the psyche of the target market is entered, allowing better insight into their personality, actions and behaviours. I followed Goodwin's definition that "personas are archetypes that describe the various goals and observed behaviour patterns among your potential users or customers" (2011, p. 229).

Because of my experience working with teenagers, and my everyday life with my stepdaughters, I have been able to learn to identify typical and atypical behaviours, challenges and emotional journeys. This includes observing interactions with technology, which has helped with my planning phase. I was also able to get direct feedback from the students that I mentor by informal observation and asking them what they thought about other musical applications.

After empathy had been established, the next step in the design process was to define my problem. As mentioned earlier, the problem was a lack of interactive applications that could assist children with emotional regulation. Defining the problem was especially useful in clarifying the scope, purpose, and aim of the project. At this point, the objective became clear: *to design and develop an interactive music creation application that could serve as a wellbeing tool and assist with emotional recognition*.

I opted to stay with a wellbeing approach for the application, as to not enter into the scientific realms of clinical practitioners and psychology, leaving the primary purpose of the application to focus on creative expression, fun and general wellness.

The user-friendly design elements of this project were essential to ensure excellent UX/UI interaction. Through researching existing applications such as *Cove* (Humane Engineering, 2019) and *Settle Your Glitter* (Momentous Institute, 2014), *Reflecty* (Reflecty Aps, n.d), *MellowMe* (Spring Tech Co., 2018), *Calm* (Calm.com, 2018). I was able to study the flow and usability of their design to glean ideas and inspiration for my application. Reaching out to peers and interacting with target group candidates informed changes to my approach to design before prototyping my application. A practical

example of this was setting up a *Live* session with simple musical loops to investigate how children interacted with the concept. (See Appendix B)

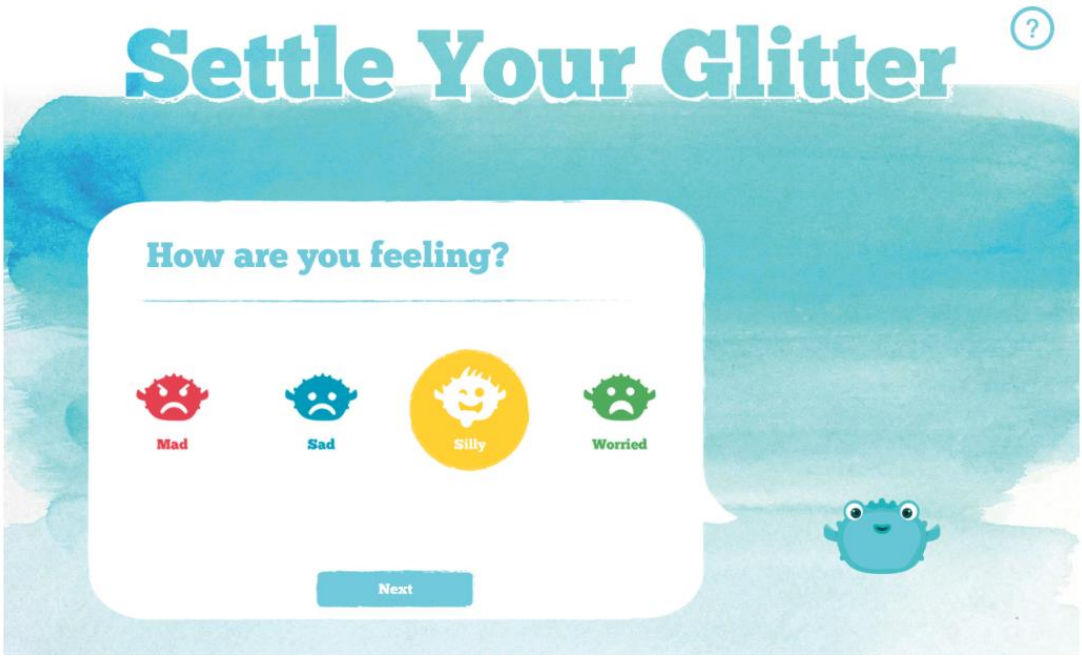


Figure 4. *Settle your Glitter* application screenshot

Momentous Institute. (2015). Settle your Glitter. [Image]. Retrieved from https://www.youtube.com/watch?v=PSKLuV8rGAI

Settle your Glitter (Figure. 4) is an existing example of a wellbeing application that utilises a similar measurement of emotions before and after the primary experience. I analysed the user interactions and flow and noted which actions were intuitive and which seemed unclear. Settle your glitter primarily uses strategies of visual stimuli to help users focus on calming or by coaching the users with breathwork as part of this wellness process. I couldn't get the glitter to move on my device even though I knew it was supposed to. This illustrated the value in ensuring an application is tested over several different platforms with different operating systems. Settle Your Glitter did not employ the same interactive music-making as *My Music Time*; instead, it focuses on mindfulness activities, but they do cater for a very similar audience with the same emotional wellbeing focussed outcome.

Other online music production tools were identified, which include Ableton's Learning Music (beta), Garageband by Apple and Soundtrap, but I do not consider them to have the same intention or goal as my application. For example, Ableton's learning music attempts to teach the user music production, and within a concise time, they are responsible for creating their own musical ideas; this could be overwhelming for a young person who is already in a traumatic or stressed state of mind and unlikely to

engage with learning. Soundtrap is an online collaboration platform but requires a paid membership and account creation which makes it logistically cumbersome and unlikely to be useful for educators or support workers.

As with most creative processes, my project had several ideation steps, settling on a focussed and simplified approach for the final product. For the application, I moved from a MAX MSP-based program to a web-based application while the music had three significant revisions to transpire into this final version.

The application functionality is organised into four raw human emotions (Happy, Sad, Nervous, Angry) with four different musical elements (Drums, Lead, Bass, Timbre). I chose these four basic emotions after Dubois and Adolphs' (2015) suggestion to reduce the traditional six primary emotional states (which also include fear and surprise) to better fit into my interface design framework. It is worth noting that in Neuropsychology, the number of emotional states remains disputed.

The participant interacts with the musical elements and possibly establishes or recognises an emotional state or mood. Being able to combine musical emotions simultaneously perhaps allows for their own interpretation and expression of more complex emotions. One of my early revisions was the substitution of the term "nervous" with "worried", as we realised this term might be slightly confusing for younger children.

Being able to record the interaction through the web application and capture a visual representation on the administration page (See Figure. 5), I was able to analyse the interaction of the participants and the patterns they produced. After the first week of testing the application, I changed the post-engagement survey so that users could respond to whether they felt "better", "worse", or "the same" compared to before their interaction. We also introduced a question to establish the age of participants that assisted with the interpretation of data.

I was interested to see how emotional states were affected after interacting with the program and particularly in how many interactions the average user would engage.

Figure 5. Early iteration of journeys captured anonymously with session IDs, reflecting four emotional states.

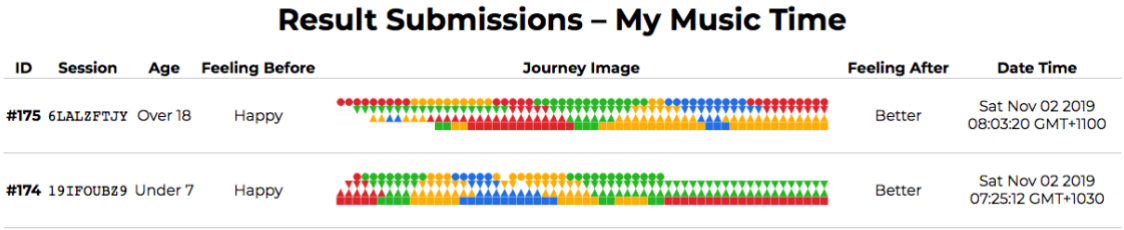


Figure 6. Revised results of interactions now showing age, the journey image and post feeling reflections.

When designing the user interface (UI) and assigning colours associated with emotions, I used Robert Plutchik's Emotional Colour Wheel (Figure 7). I have also observed other therapists and clinical professionals use the same colours for worksheets and monitoring activities with special needs children.

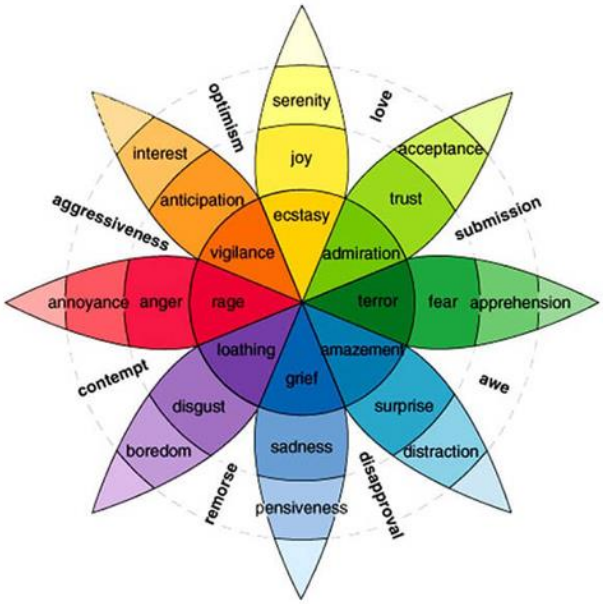


Figure 7. Emotional Colour Wheel

Plutchick, R. (1980). Emotional Colour Wheel. [Image]. Retrieved from https://www.interaction-design.org/literature/article/putting-some-emotion-into-your-design-plutchik-s-wheel-of-emotions

Interaction design (IxD) was the next fundamental part of my project. Put merely, IxD is the interpretation and orchestration of users' interaction with their product. The focus of my work concerning this element is understanding the way that the children interact with the musical creation features of the wellbeing application. My design strategy relied heavily on a combination of prototyping/testing and a focus on design principles for children.

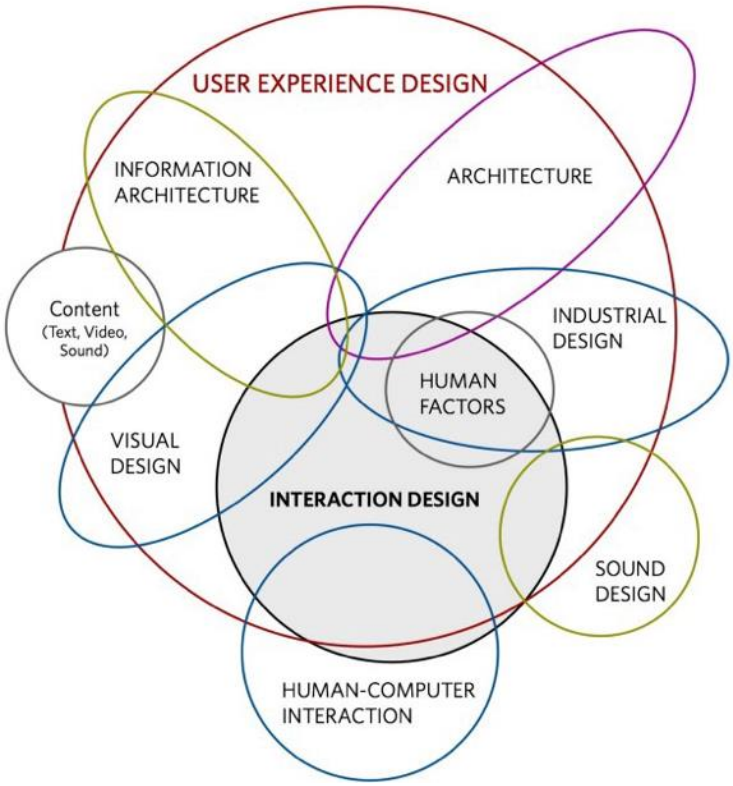


Figure 8. Graphic depiction of interaction design strategy.

Brar, S. (2018). Generic Interaction Design Strategy. [Image] Retrieved from https://uxdesign.cc/10-steps-to-interaction-design-ixd-6abe778cb8b8

My process was similar to that described by Ward et al. (1995), whereby large numbers of prototypes would be created prior to finalising the design. "This is contrary to common design wisdom that calls for deep exploration in the conceptual stage, before fabrication" (Ward et al., cited in Yang, 2005, p. 649).

My approach was simplified as I already possess a great deal of experience and a deep understanding of music technology and performance-based applications. My personal experience and observations with my target group also guided the production and compositional prototyping of the application. There were several iterative design cycles with refinement and updates for the design, user experience and user interaction. As my process unfolded, my understanding expanded, and my knowledge deepened.

Prototypes can be thought of in terms of their purpose or the categories of questions they answer about design. Yang (2005) describes four classes of prototypes based on their function and stage in product development: “the proof of concept, proof of product, proof of process and proof of production” (p. 651).

I followed the first two stages outlined by Yang using Adobe XD. This design tool is specifically designed as an application prototyping software and allows for rapid visual and navigational prototypes used for testing. Initially, I also used Marvel for mock-ups but found XD far superior in terms of its ability to test navigation and menu structures as well as being able to export assets to developers with greater ease. It was during these early stages and sharing with the developer that we refined a few elements, including the positions of the arrows as to not confuse the user with UP/DOWN functionality (See Figure 8).

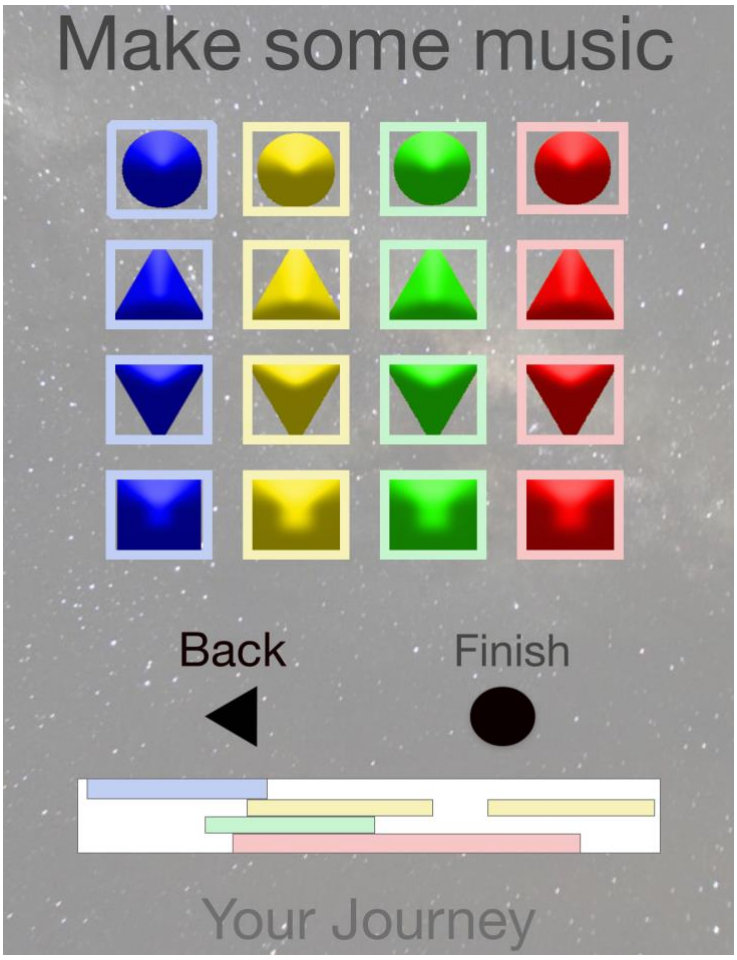


Figure 9. Early iteration of the interaction interface.

After further testing, I identified a few other design alterations to benefit future versions of the application, including allowing untimed interactions with a manual finish button. This feature was in the original design, but I decided to use a timed interaction instead to encourage users to return to the beginning for collecting consistent data.

I utilised two approaches when thinking about designing for children. The first was a design-based approach by Debra Gelman (2014), and the second, an ethics-based approach as outlined by the Designing for Children's Rights Organisation (http://designingforchildrensrights.org/).

Gelman introduces four "As" of digital design for children: Absorb, Analyse, Architect, Assess. These steps are similar to the design process used when designing adult products, but the way one evaluates programs for children, the elements one looks for and the way one measures success are different (Gelman, 2014).

This framework can be related to the design thinking process, where we empathise (Absorb) to understand our users. We define (Analyse) the information and observations, after which we follow on by designing (Architect) our interaction, and finally, we evaluate (Access) our interaction.

During the early prototyping and research, I created a session within Ableton, where I asked some children to trigger sounds. The point of this exercise was to establish the conceptual understanding of triggering sounds and loops, and I gained some valuable lessons from those early observations. This exercise lines up well with Gelman's suggestion to create a working prototype to see how flows and interaction are experienced.

The Designing for Children Organisation set out to "create awareness about the importance of keeping children's rights in mind when building products and services"(Children's design guide, What We Do. 2018). These ethics are critical factors that I have considered during my design, development and testing phases.

One of the main challenges I faced as I collected quantitative data for my research (Key Principle 5) was ensuring no one's personal details were captured. With the help of my developer, we were able to assign a unique session ID to every user that started the application. This session ID would remain the same until a user cleared their cookies. One of the problems with this approach is that if several users were using the application on the same computer, I would not be able to distinguish between them.

With the introduction of the "age identifying" information, we could limit this skewing of data if users were not the same age. But there was still a very great likelihood that some users used the same session ID.

The Designing for Children's Key Principle 1 states: *Everyone can use*. One of the main reasons to establish this program as a free web-based program was to make it as assessable as possible with future iteration, possibly including an offline function.

I stayed within the Key Principle guidelines and aimed to make the program unobtrusive, fun and as intuitive as possible for the users. The users provided informed consent through and were encouraged by their parents to play, and there were no rewards for participating.

Creative Process

The two main creative elements of this project are the design of the application and the musical composition.

In the *Children's Design Guide*, Key Principles (version 1.3), point 3 states:

> Help me understand my place and value in the world. I need space to build and express a stronger sense of self. You can help me do this by involving me as a contributor (not just a consumer). I want to have experiences that are meaningful to me. (Children's design guide n.d., point. 3)

Involving the user to pursue self-expression and creative play was one of the main goals I sought, and I based my design on these principles. The primary interaction of the application is split into three stages. First, the user establishes how they are feeling, after which they interact with the music-making platform, and finally, they reflect on their emotional state and whether there was any change in mood.

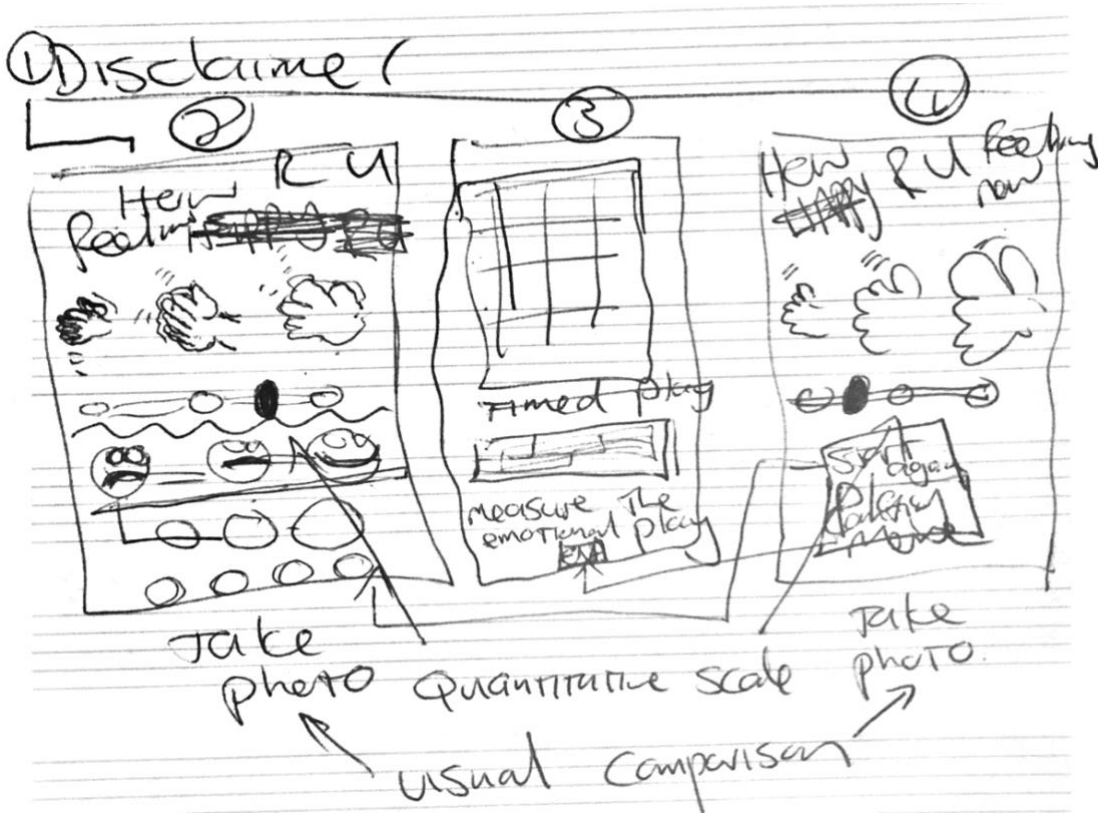


Figure 10. Brainstorm / Rough drawings of interaction Design.

Initial ideas included sliding scales to establish the emotional states as well as the use of selfies to supply more data for analysis. Still, I quickly realised that if I were to

follow the 'Designing for children Ethos', I needed to keep the design simple.

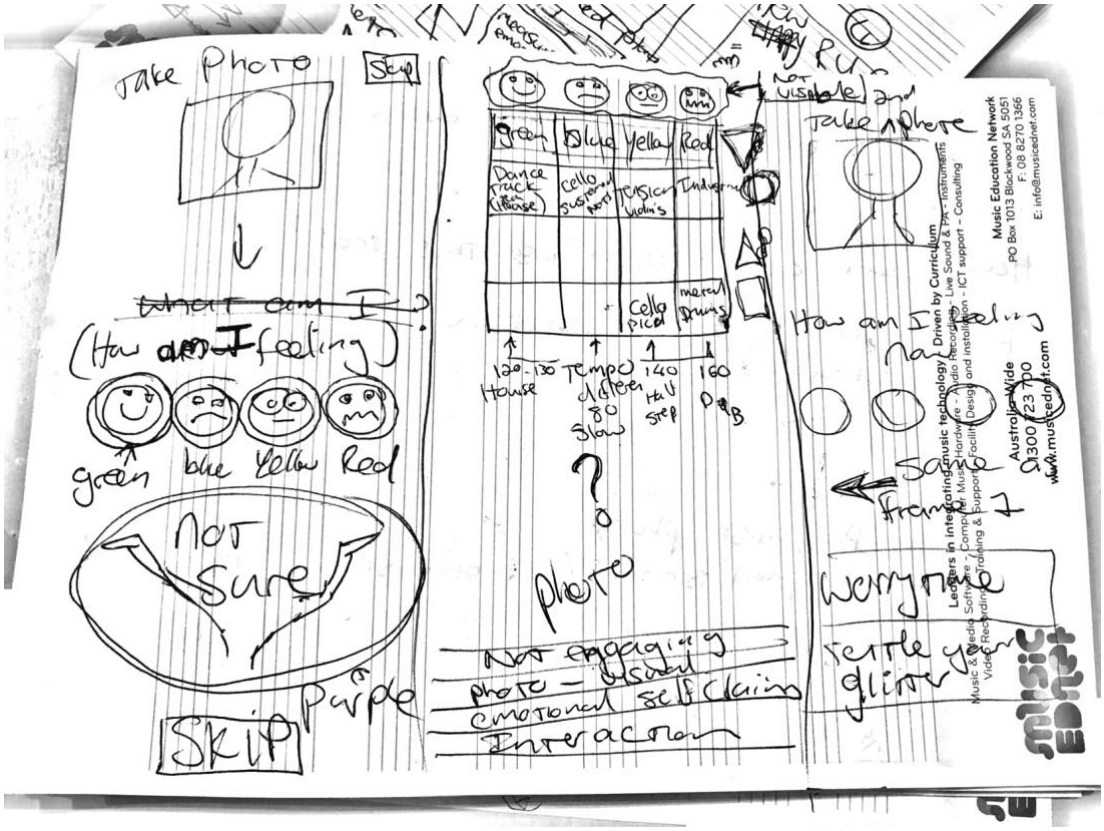


Figure 11. Final Design/Music Brainstorm.

Working with colours

As mentioned in the methodology, the use of primary colours to establish a link with emotional states is a common practice among clinical workers, and I adopted and interpreted this framework. As there are no definitive rules, I did apply some creative freedom and interpretation in my colour assignments. An example of this is the colour green, which is often used as "jealous", but I used it for my "worried" emotional state.

A great contemporary example of these emotion and colour associations can be seen in the colour pallet of the animated movie, *Inside-Out* (Figure 12).

Figure 12. Promotional graphic from *Inside Out* depicting emotion/colour correlation.

Pixar. (2015). Inside Out [Image]. Retrieved from https://www.bibalex.org/SCIplanet/en/Article/Details.aspx?id=12336

Working with faces

As part of the user experience, I wanted to explore a way to engage the users to explore the interface and use their imaginations. Using emojis was one of the first ideas that came to mind. As part of the design process, I did design my versions, but after some reflection, I opted to use the standard emojis as I felt these would be better recognised and understood.

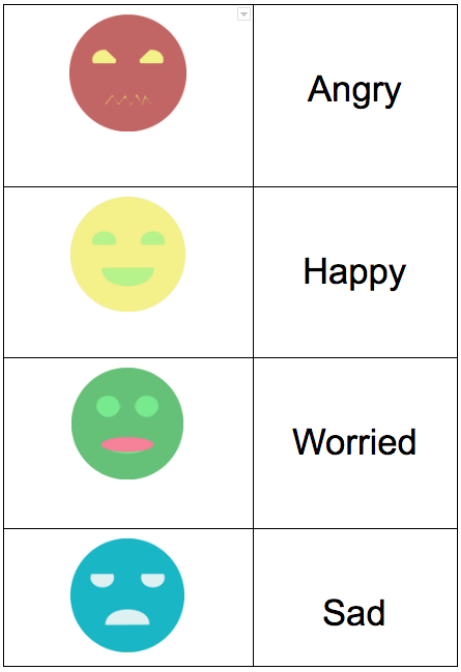


Figure 13. Emojis represent emotional states.

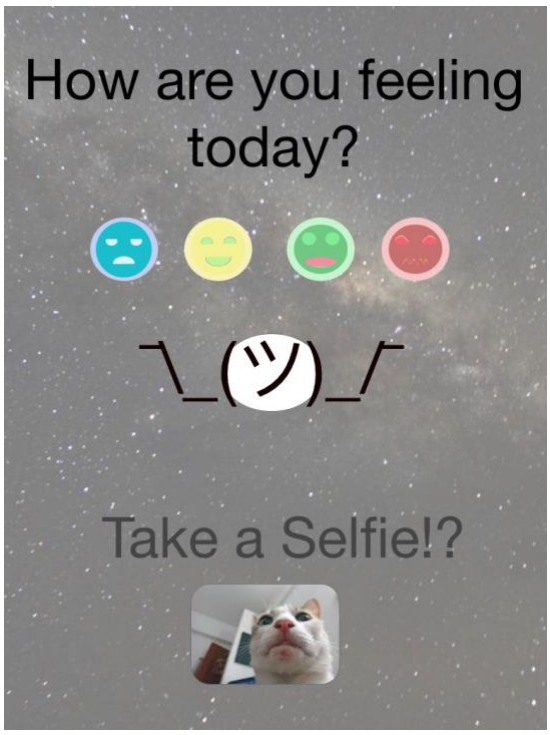


Figure 14. My first design for the start-up page.

Figure 15. The first online iteration of emojis.

As can be seen in Figure 15, the first iteration from the developers has the standard emoji colours. I felt that it would benefit the users to have the emojis in the same colour as the musical blocks to assist with the association that the music is, aligned with emotion and colour.

Figure 16. The final iteration of the opening screen.

Working with shapes

For the musical interaction page, I also worked on the concept of association and interpretation, so I needed to find a way to represent the four musical elements.

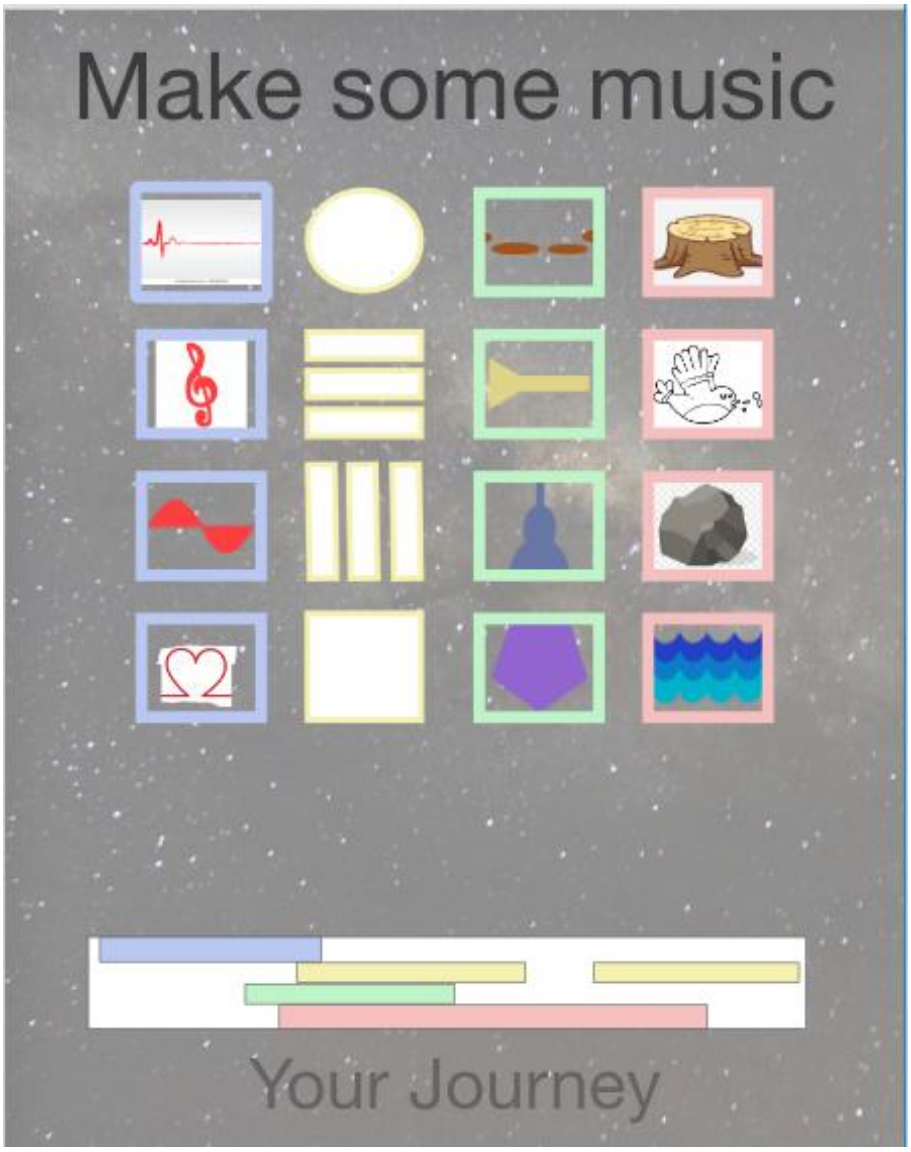


Figure 17. A summary of visual ideas I initially wanted to use for the musical platform.

From early on, I thought the idea of using shapes would be a more exciting and engaging approach instead of using icons. Again, interpretation is a very personal experience, and what I considered to be logical or self-explanatory may not have been the same for anyone else. Interpretation clearly illustrated when I discussed these initial ideas with my supervisors, and one of them mentioned that the heart image should be associated with the drum beat and not the timbre as I had suggested.

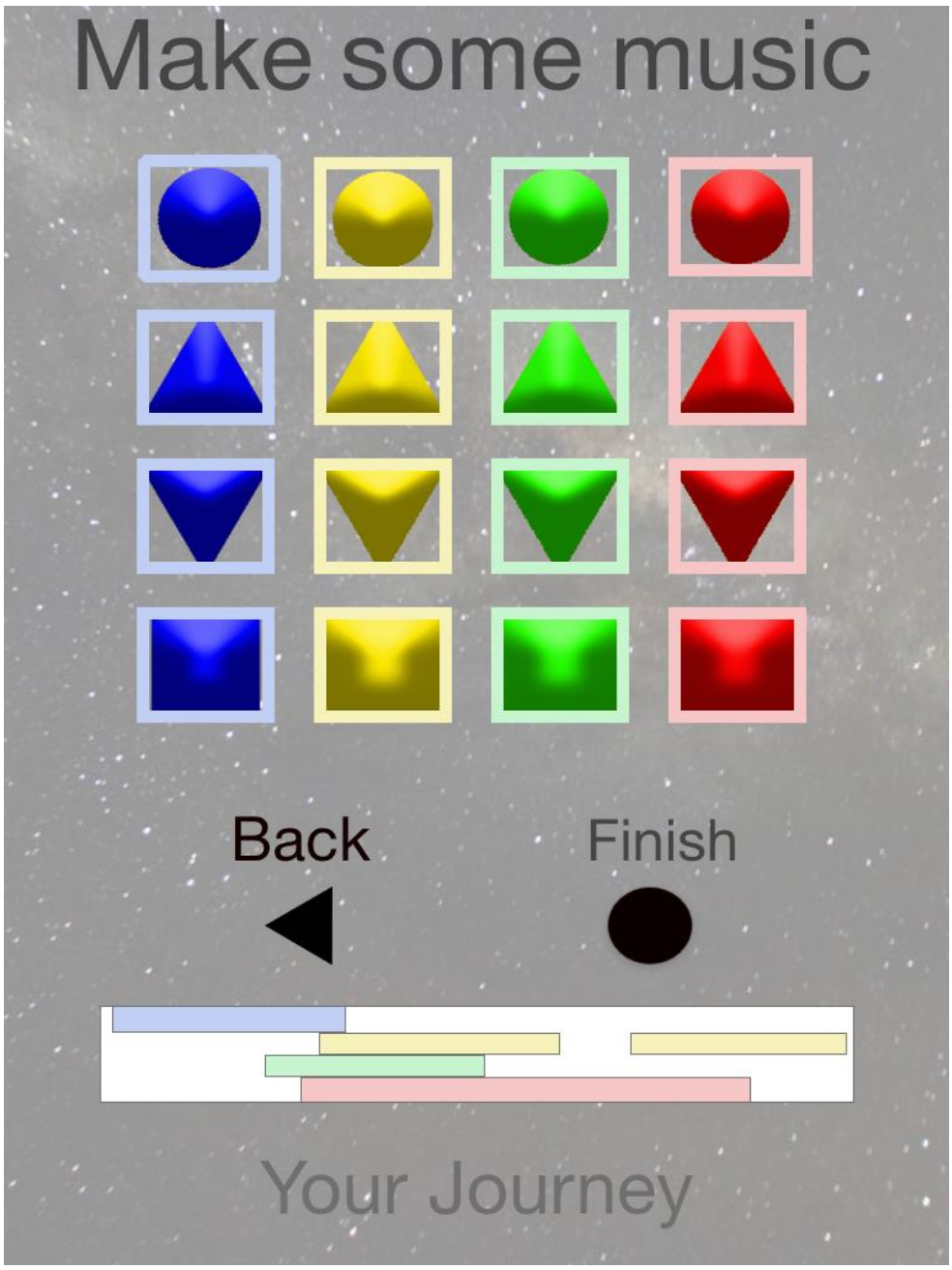


Figure 18. My first design iteration of the music-making page.

I used my creative prerogative and opted for the following associations and images, with the aim that the user would be interested in exploring the different shapes and working out what they do.

	Melodic / Lead - Arrow pointing upwards to represent the higher frequency content of this element.
	Bass - Arrow pointing downwards to indicate the lower frequency content of this element.
	Drums/Rhythmic - Round shape associated with the kick drum or percussion drums.
	Timbre - Square shape associated with a complete encompassed sound that established the emotional connection to the music.

Figure 19. Visual representations of musical elements.

Music

One of the philosophical issues, as noted in *the Oxford Handbook of Music Psychology*; "music itself can neither be happy nor sad" (Grahn, 2016, p. 285). However, we have been programmed within our cultural context that certain sounds, musical scales and chords, have emotional associations. During my research and creative process for the musical elements, I quickly concluded that I should not focus on conventional musical scales to represent specific emotional contexts. It is so well known that *major* scales represent happy sounds and minor scales sad sounds. Still, as mentioned before, within this simplicity, there are several complexities, including the Contrast Effect that could influence a user's reaction or interpretation. So, I decided to employ sound design techniques instead to create the music. Taking inspiration from Terry Riley's *In C* (1964) composition, the music was composed in the key of C major and allowed for undetermined lengths of performance. I used other compositional techniques to help me expand emotional connections. After experimenting with the length of the music loops, I found that eight bars were the optimal length to ensure that phrases from different emotional pieces can work together. As mentioned before, all the musical loops were in the same musical scale and composed to work together to allow for various combinations of emotional states.

Even though I used some reference tracks, ultimately, I have used my artistic discretion to create pieces of music that would represent the emotions in a way that fit my creative practice. In the following paragraphs, I give some examples and illustrate the sonic qualities that I used to create my pieces. Details of the final instruments (including effects racks) and MIDI programming can be found in Appendix A.

Traditionally within Western culture, happy music is represented with a *major* key. The tempo is also typically quite upbeat (120–130 Bpm), as can be seen with dance music. Chicago house music is an excellent example of happy sounding contemporary dance music. Historically the genre originated from disco music in a cultural and socioeconomic environment celebrating diversity and gay culture. The genre also employs vocal sampling of positive messages, and that often imitates a church sermon or themes of love.

Figure 20. Example of Caribbean style dance music.

Dyment et al. (2014). I Got U [Duke Dumont]. On *I Got U* [MP3 file]. United States: Virgin EMI (2012) Retrieved from https://open.spotify.com/track/4r8hRPbidDIoDPphxi78aY?si=xB6FHsCcTTuEuJz5ZY_1ng

In conjunction with a "house" framework, I drew inspiration from a "tropical" aesthetic sound pallet when I created the music for the "happy" emotion. I thought that the association with a warm beach summer and perhaps a reminder of holiday would invoke a happy emotional connection (see Fig. 20).

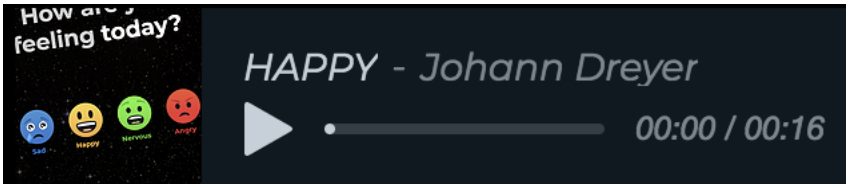


Figure 21. Happy - complete mix with all 4 elements.

PLEASE LISTEN TO MEDIA EXAMPLES HERE

As illustrated in Fig 21, I used bouncy sounds and higher-pitched plucked percussive sounds as the leading production elements in this mix. Using live percussion and claps in the rhythm section also creates more of a human connection that seems to invoke a happier/livelier feeling. On one Facebook post commenting about the app, this emotion was cited as the most "well-liked" musical element and received quite a few compliments on the "good vibes" and "happiness" people experienced (personal communication, October 27, 2019).

Minor chords and scales are considered sad in contrast to the way that *major* scales are happy within a Western musical construct. The rhythmic elements are also

traditionally slower, perhaps 80 -90bpm, and would often imitate a type of contemplative march or ceremony. Chopin's Sonata Op. 35 Mvt. 3 (Funeral March) could be considered an archetypical sad sounding piece of music that also possesses the grimmest associations; in a more contemporary context, we can experience a similar aesthetic with Gary Jules' interpretation of the song "Mad World" (Fig. 22).

Figure 22. Example of emotionally driven sad song from *Donny Darko*.

Orzabal. R. (1982) Mad World (Recorded by Gary Jules) *On Trading snakeoil for wolftickets* [MP3 file]. United Kingdom: Down Up Down Music. (2012) Retrieved from https://open.spotify.com/track/3JOVTQ5h8HGFnDdp4VT3MP?si=6NSprtkTRvCVBwagZGMQ4A

To create my sad aesthetic (Fig. 23), I focussed on a slower pace and more drawn out and slow-moving instrumentation. I used string instruments as I felt that their sonic characters could easily evoke this emotional connection. I also incorporated more contemporary synthesised sound to create an eerie and lonely ambience. The corresponding rhythmic elements were purposefully programmed to be very sparse and minimal with a marching style snare drum to simulate a funeral type march.

Figure 23. Sad - complete mix with all four elements.

PLEASE LISTEN TO MEDIA EXAMPLES HERE

Building tension is a fundamental part of western music composition, and one could argue that this evokes feelings of anxiety or worry. There is a myriad of great examples in classical music (Chopin - Nocturne op.9 No.2, or perhaps Mozart's Requiem). Harmonic tension is always created by using dissonant chord structures and unresolved progressions. In a more modern context, a lot of jazz music uses diminished chord structures with fast-moving patterns to create intensified musical experiences.

Figure 24. Radiohead has a long history of creating tension building music.

Greenwood. C. (2016) Burn the Witch. (Recorded by Radiohead). *On A moon shaped pool* [MP3 file]. United Kingdom: XL Recordings. (2016) Retrieved from https://open.spotify.com/track/3pcCifdPTc2BbqmWpEhtUd?si=Cs1T4bC9TAGe-XM30TBs4g

There is a level of intensity that is created with the use of Staccato violins and a seemingly broken drumbeat in the Radiohead track “Burn the Witch” (see Fig. 24), and this is what I attempted to do with my worried piece. I focussed on a very sparse drum element and tried to have the string instruments lead the arrangement. Thom Yorke (Radiohead) also experiments with dissonant chord structures that create interesting musical content and tension. I, however, did not employ any diminished chord structures (see Fig. 25) but instead focussed on the A minor scale (relative minor of C major) and sound design techniques.

Figure 25. Worried - complete mix with all four elements.

PLEASE LISTEN TO MEDIA HERE

One of the production techniques I used was a sustained high pitch sound with a modulating filter envelope that helps to create tension. This is a standard procedure and can be seen in many modern compositions across different genres. Another technique is to find an energetic section and loop that at an uneven loop length, creating an illusion that the music doesn't resolve frequently and building extra tension for the listeners.

As with tension building in Western music, angry music is traditionally represented by fast tempo and lower register instruments playing slower progressions. In comparison, higher register instruments play staccato type phrases, creating somewhat of a representation of chaos. In a more modern context, the invention of distortion and the use of the tritone by the heavy metal godfathers Black Sabbath set the tone for many sub-genres of angry music. One of my personal favourites is Industrial music. Standard

production techniques include the sampling of industrial machinery with slow and heavy drums accompanied by distorted guitars also playing slower rhythmic chugs using the palm mute technique (see Fig. 26).

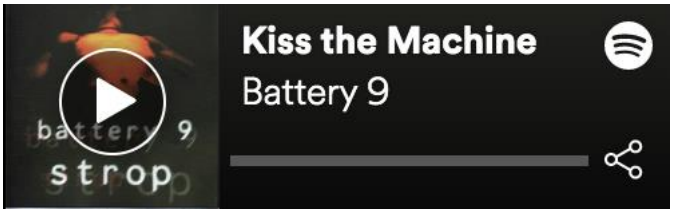


Figure 26. Battery9 demonstrates angry sonic aesthetic.

Riekert. P. (1996) Kiss the machine (Recorded by Battery 9. [MP3 file] On *Strop* [CD] South Africa: One F Music. (2015) Retrieved from https://open.spotify.com/track/067AwLFO7XkninBiXvvkBF?si=xuL-JnmGR4qpS5vELuYVKg

I embraced the production techniques of the industrial genre and applied distortion to my half time programmed drums (Fig. 27). As this genre calls for a very mechanical feel, the pattern was hard quantised with no swing applied to the drums. I also used some looped mechanical sounds to help create an acceptable aesthetic for the genre. Lastly, I used a distorted string sound to play a type of melodic phrase and enable some movement in the piece.

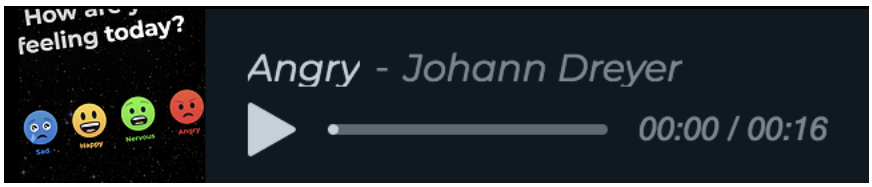


Figure 27. Angry - complete mix with all four elements.

PLEASE LISTEN TO MEDIA HERE

Findings

Gathering data for the evaluation of the application, I shared it via social media platforms on 27 October 2019, and I drew the last set of data for analysis on 12 November 2019. As I have school-aged children and a network of similar demographic households, I knew that I would reach a sufficient number of participants in my target age group if we shared the application through my personal networks and those of my partner.

Data generated from the application's user logs over 21 days recorded 205 interactions with the application. This is a reasonable sample size considering the timeframe and the limitation of the personal networks through which the application was shared. The App. logged the data ethically and anonymously to assist me with analysing limited user demographics, the number and frequency of individual user engagements with the app and the reflection of musical play on the emotional state of the user. All users had to report at both the start and end of the session, and the session would not be logged if it was closed early. The following discussion of findings is based on this data set.

Engagement across the age range

Summary					
AGE GROUP	Under 7	7-12	13-18	Over 18	Grand Total
REFLECTION					
Better	50	39	3	50	142
Same	9	8	1	38	56
Worse	2	2	0	3	7
Grand Total	61	49	4	91	205

Figure 28. Summary of participant age data and post-experience result.

Finding 1

The majority of users were Over 18 (44%).

Discussion

As is the practice in our household, mainly when dealing with children in the age ranges of 7-12, there is a process where parents would usually check an application before they allow their children to play or download it. So, it is no real surprise that the majority of users were over 18. When we look at the Under 7 and 7-12 categories added together, it

closely matches the number of the Over 18 group. This would indicate that all parents tested the application at some stage.

Future Considerations

This phenomenon has raised an opportunity to explore a similar product for adults, perhaps changing the musical themes or adding a relaxation component to provide adults with some self-help and relaxation time. The inclusion of links to resources around wellbeing and other suggestions to help the parents with emotional regulation strategies with their children could also be very helpful. Another possibility could be to share the results from the musical journey with the parents, with the child's consent, so that they could keep a digital diary to track patterns of emotions over time.

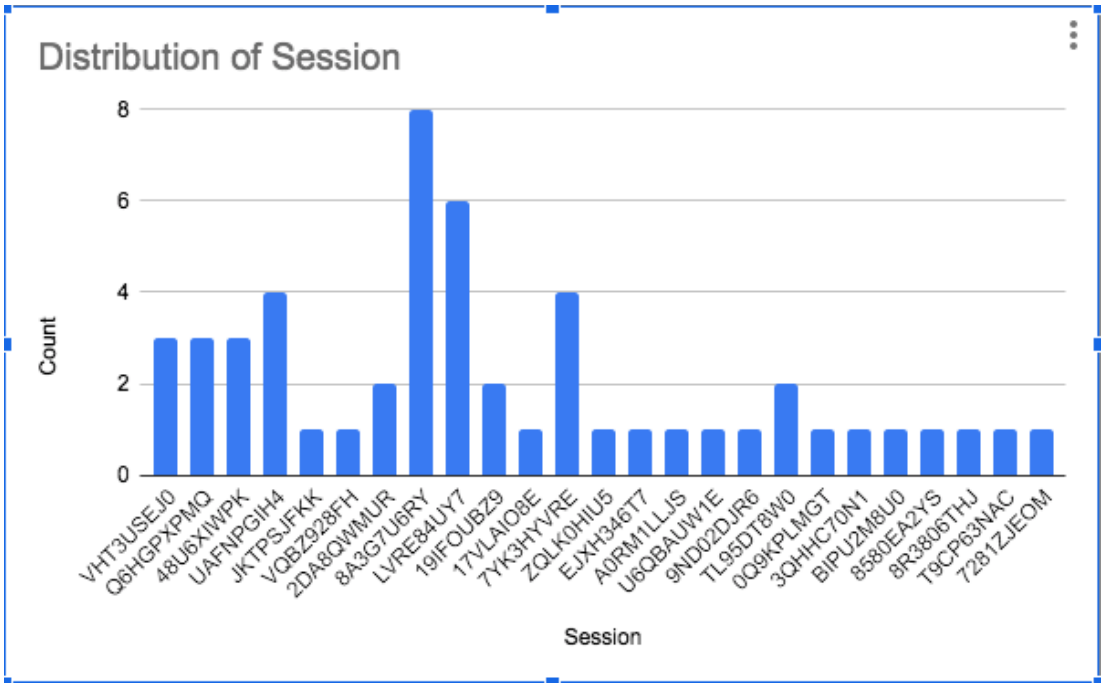


Figure 29. Session distribution of "Under 7" age group.

Finding 2

There was a large number (30%) of Under 7s who participated (see Fig. 28), and they had the highest number of repeat interactions (see Fig. 29).

Discussion

It came as somewhat of a surprise that such a large proportion of participants in this subgroup (30% of the total sample size) used the application. They had an

average of 2.08 interactions, but as figure 29 shows, several users interacted three or four times, with two users completing six and eight sessions each. One hypothesis could be that it was just a random occurrence since we have a large number of children in this subgroup within our network of friends. Still, perhaps my simplistic design and use of primary colours were the reason for the higher number of repeat interactions.

Future Considerations

Two factors should be considered in this regard; firstly, if the design and interaction are too simple for my actual target group, I would need to reconsider a more challenging and interactive experience to engage them. I have to mention that my youngest stepdaughter (Ursa) was not that impressed with the "game" because nothing apart from music was happening. She was expecting a more interactive experience, and this should be a consideration for future versions.

The second factor is that if the design and layout are, in fact, more relevant to the under seven groups, I should just focus this version on them. I would, however, research the musical elements and establish if the current musical content is appropriate for them.

Evaluation of user experience

In Figure 30, we can see the overall data set from all respondents; they are split into different age groups and their results post-interaction. As mentioned earlier in this document, the implementation of a measurement set where we gave the options of “better”, “worse”, or “same” was to evaluate the result of the emotional/wellbeing interaction. I aimed to measure a variation in the users’ emotional state after interacting with the application and also to investigate how they interacted with the musical elements by evaluating the *Journey Map* generated by their interactions.

Summary					
AGE GROUP	Under 7	7-12	13-18	Over 18	Grand Total
REFLECTION					
Better	50	39	3	50	142
Same	9	8	1	38	56
Worse	2	2	0	3	7
Grand Total	61	49	4	91	205

Figure 30. Summary of participant age data and post-experience result.

Findings

The great majority of users indicated a better emotional state post-interaction (69%), with the lowest result from the over 18s.

Discussion

It is interesting to note that across the different subgroups, there is a clear pattern of the participants indicating feeling better after interacting with the application. This is a great result, and I am pleased that the application has shown some promise as a possible wellbeing tool. As illustrated in Figure 30, the percentage of participants by age who indicated feeling better after using the app were as follows:

- 82% of the under 7s
- 80% of the 7-12s
- 75% of the 13-18s
- 55% of the over 18s

I believe that the lower number of over 18s response could be due to the participants not relating to the music. Adults would have a much richer and complex palate for music and interactive experiences, and this application is situated under their normal expectations. A colleague also suggested that it could be because adults are more resistant to the idea of play and emotional response to music. This contention seems to be supported when compared adult data to the Under 7s subgroup.

Future Considerations

As this program is aimed at a younger audience, the older audience responses and interactions are less relevant. I would instead explore an add-on service that could be beneficial to the parents and assist them with their specific emotional and wellbeing needs.

Analysis of highest frequency user

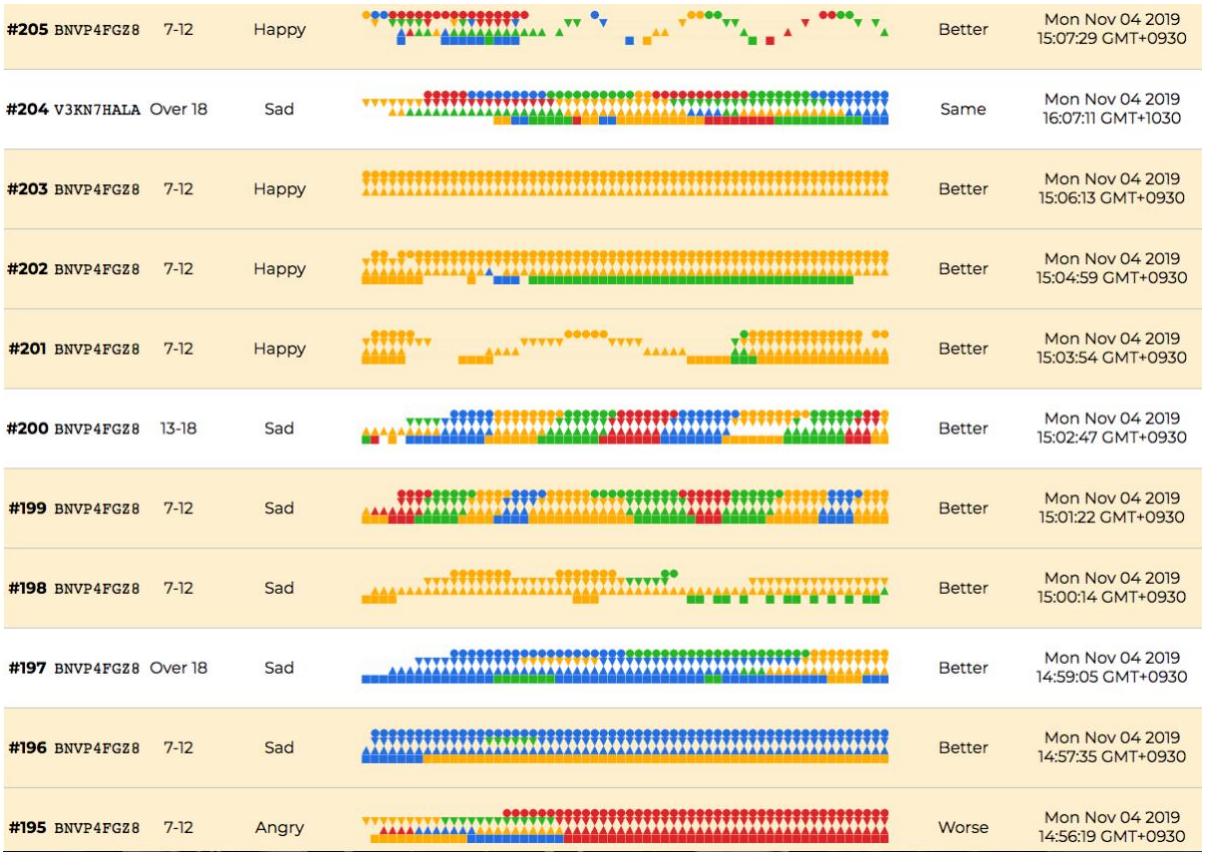


Figure 31. Report and Journey Maps from Database for BNVP4FGZ8.

Finding

User BNVP4FGZ8 had the greatest number of interactions and showed some interesting variations in emotional state and outcomes.

Discussion

This user's interaction is unique, and if we look at the user's *Journey Map*, we can see how during their first interaction, they were playing predominantly from the "Angry" category after stating that they felt angry. They then moved to feel sad and played mostly sad music.

At session #197 (third from bottom), the age changes to the "Over 18" category. When analysing the time difference between the sessions, it is plausible that someone else could have taken the device also to participate. When analysing the timestamps, it seems that the device was given straight back to the 7-12-year-old user, who then experimented a bit more with the different emotional states, after which they started focussing more on the "Happy" emotion. This includes a session where they selected 13-18 as their age. These are obviously all assumptions, and there is also a chance that all the interactions were by the same user experimenting with the different age options.

It is worth noting that on the last interaction, the user seems to be using the visual feedback and creating a pattern with the *Journey Map* with seemingly little regard taken for the musical cohesion. This will be explored more in the next finding.

Future Considerations

Upon reflection, I feel that it would be a natural occurrence for any user to select all the available options (apart from younger than their actual age) to experiment and establish whether the interface changes at all for different age groups. I think this is an excellent indicator of the inquisitiveness and exploratory nature of the younger user groups. I could perhaps encourage this phenomenon by adding another layer of randomisation to encourage exploration. Maybe the introduction of colours to determine different sonic themes.

Creating patterns instead of music

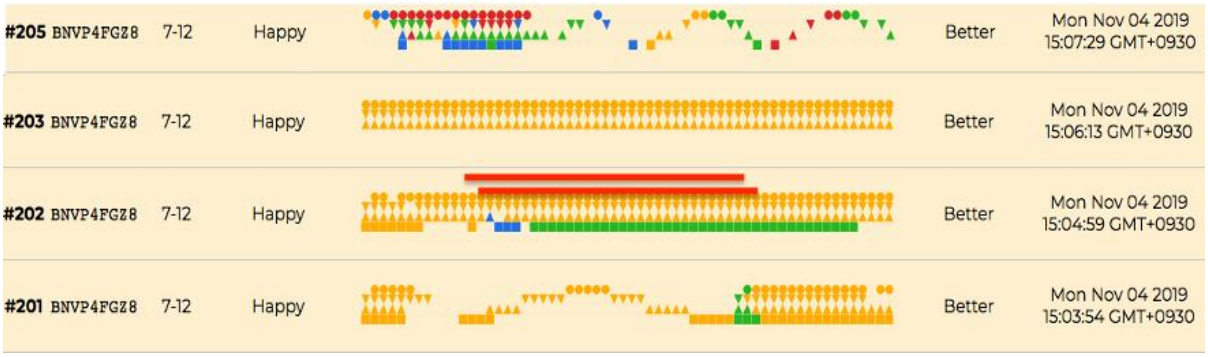


Figure 32. Report and Journey Maps from Database for BNVP4FGZ8.

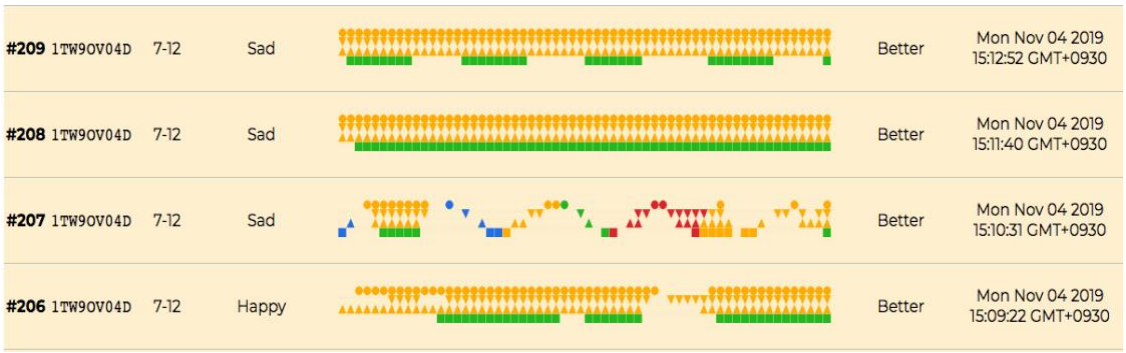


Figure 33. Report and Journey Maps from Database for 1TW9OV04D.

Finding

Some users started using visual feedback from the Journey Maps to create patterns.

Discussion

Something which came as a great and delightful surprise was when I noticed how some users created patterns using the visual feedback within the *Journey Map*. Making sine

waves (see #207 in fig. 33) would have been a simple but very deliberate exercise, as only one musical element will be triggered at a time.

Future Considerations

When observing this phenomenon from a design thinking perspective, we can note answers to several questions raised in my other findings. What are the natural patterns of interaction for different aged users? How do we make the application more interactive for the 7-12-year-old sub-group?

I could implement an interaction in which the user either has to mimic the visuals, participating in a Guitar Hero (RedOctane and Harmonix, 2005) type of experience, or create a freeform visual that then translates into a song. In terms of gamification, this journey could be implemented in other gaming formats, perhaps as a treasure hunt or problem-solving experience.

Final Reflections

This chapter is divided into two sections: ‘Going forward’ discusses future consideration for the project, and ‘Distance travelled’ represents a conclusive summary of my learning journey.

Going forward

The following section discusses material changes and future adaptations to the project that have not been addressed in the discussion of findings presented in the previous chapter.

Duration of play

One of the most frequent points of feedback I was given was a desire for a longer interaction time (an untimed session). Initially, I was aiming for the sessions to be untimed. Still, practically this was not viable, firstly due to technical aspects pertaining to the journey map and secondly due to time and financial restraints. This will be addressed when expanding the application into a stand-alone platform.

I noted how initial feedback confirmed that people’s interpretation of sound is a very personal one, where some interpreted ’ angry’ and ‘worried’ sounds as being excited or happy. It would be interesting to observe how a more extended experience would allow for more experimentation with different sounds and to explore these emotional states further.

Platform

As interactive technology and mobile connectivity make web-based applications accessible to global audiences, I decided to create a web-based application as part of my first functional product. For future iterations, I aim to focus on creating a standalone application. This could allow for offline interaction for people who may not have internet access and would make the program more accessible globally.

Overall, the interaction design was well received, with all feedback indicating that the interface was well laid out and self-explanatory, even for users aged lower than my target audience. I believe that the use of primary colours and basic shapes, which

aligned with the design principles researched, was a good indication of engagement; as mentioned earlier, it had a more significant effect on the Under 7s sub-group than I had anticipated.

Overall, I am happy with the way people interacted with the application. It would have been great if I had a higher frequency of interaction from single users. Still, it has to be noted that the session ID is dependent on the IP address, and if a user had cleared their *cookies*, they would be assigned a new IP address and subsequently a unique Session ID. In a household where several children or adults may have used the application, it also would have skewed the results. The age group differentiator at the start was my attempt to try and counter this, but if there were several children in the same age group, this would have been superfluous.

As a first step in continuing to develop the program, I aim to share the application and reach out to educators and therapists to get more feedback and data and explore the possibility of using the application with a closed focus group over some time. Through this process, I solidified my understanding of UX /UI and precisely the practical and ethical design principles for children's interactive applications. Going forward, I intend to continue to develop my design and programming skills so that I can create fun and functional content that can be used in these design frameworks and applications. In the immediate future, however, I would certainly outsource the app development to specialists as this will speed up the iteration cycles and productivity for development.

After developing the application into a stand-alone program, I will be promoting and marketing it more broadly. As the preliminary findings indicate, *My Music Time* has the potential for a positive effect on the participant's emotional regulation (see fig. 28). As such, *My Music Time* could become a viable commercial application—a new tool to assist young people with mental and emotional wellbeing.

Distance travelled

Throughout this project, my understanding of music and its emotional affect has developed exponentially; what began as an intuitive or implicit understanding has evolved into something more robust, underpinned by interdisciplinary research. Moreover, I have been able to leverage my new theoretical knowledge and apply these to the task of composing music with specific emotive qualities.

Through practical frameworks, I was able to research, plan and execute my research project and create a physical product. As I have not found another study that measures this direct response to musical play, I feel that my application and data will be useful for other researchers to build upon and that it could support further research into a musical and emotional response.

When I started this project, I was interested to see how people would interact with the application and the different emotional states and whether the musical experience could have a well-being impact on the users by measuring their post-experience responses. This was fulfilled, even in a small way, when I received feedback from a mother whose son was feeling nervous about a dentist visit and who engaged with my application to take his mind off the pending appointment. This led to him requesting the app the next time he felt anxious and suggests that the app helped him to achieve a form of emotional regulation.

During this process, I have learned how music can have a significant effect on a person's emotional and physiological state but also that people's reaction to music and sound is a very personal one. It is a great challenge to create music with a desired emotional connotation as people perceive sound and music quite differently.

Regarding the technology and design aspects of this project, I have learned how delicate the 'sweet spot' for effective children's interaction design can be. *Digital Natives*, as described by Bennett et al. (2008), are seen to be young people who have grown up in the digital age, who are immersed in technology and generally are spoilt with a wide variety of online interactions and applications. If you want to engage these *Digital Natives*, you must explore the most interactive possibilities; therefore, I would like to incorporate more physical activities in future iterations of my application.

As mentioned earlier, quite a few users engaged with the visual aspect of the application, and this opened my mind to several other interactive options for the application.

Even though the data indicates an increase in perceived emotional wellbeing, further testing will need to be conducted to establish the influence of the interaction, the music, and the design elements of the application. There does seem to be a clear pattern in the way the different subgroups interacted with the application, seen in the journey maps. Evaluating the interaction was the sole purpose of this feature, and I am pleased that I integrated it into the application. The data that this generated shows that the

younger groups are more adventurous or spontaneous, diving straight in and playing different sounds together. The older groups tended to spend more time testing it out before they explored multiple sounds played together.

Overall this project and the framework that supported it has developed my scholarly knowledge and understanding of creative research, music, and design thinking. While at the same time allowing me to make a positive contribution to the areas of music and emotion and particularly wellbeing through interactive music programs. I believe that the development of my program can assist other scholars and clinical researchers to aid them in further exploration of these areas.

List of References

Avison, D. E., Lau, F., Myers, M. D., & Nielsen, P. A. (1999). Action research. *Communications of the ACM, 42*(1), 94-97.

Bhatara, A., Quintin, E. M., Levy, B., Bellugi, U., Fombonne, E., & Levitin, D. J. (2010). Perception of emotion in musical performance in adolescents with autism spectrum disorders. *Autism Research, 3*(5), 214-225.

Brar, S. (2018). Generic interaction design strategy. Retrieved from https://uxdesign.cc/10-steps-to-interaction-design-ixd-6abe778cb8b8.

Buitelaar, J. K., van der Wees, M., Swaab-Barneveld, H., & van der Gaag, R. J. (1999). Verbal memory and performance IQ predict theory of mind and emotion recognition ability in children with autistic spectrum disorders and in psychiatric control children. *The Journal of Child Psychology and Psychiatry and Allied Disciplines, 40*(6), 869-881.

Chiasson, S., & Gutwin, C. (2005). Design principles for children's technology. *Interfaces, 7*, 28.

Dam, R., & Siang, T. (2019). 5 Stages in the Design Thinking Process. *Interaction Design Foundation.* Retrieved from https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process

Davidson, J. W., & Krause, A. E. (2018). Social and applied psychological explorations of music, health and well-being. In N. Sunderland, N. Lewandowski, D. Bendrups, and B. Bartleet (Eds.), *Music, health and wellbeing* (pp. 33-63). Palgrave Macmillan.

Demirgüç-Kunt, A, Klapper, L., Singer, D., Ansar, S. & Hess, J. (2018). The Global Findex Database 2017: *Measuring financial inclusion and the fintech revolution*. Overview booklet. World Bank. License: Creative Commons Attribution CC BY 3.0 IGO

DeNora, T. (2000). *Music in everyday life*. Cambridge University Press.

Dingle, G., Hodges, J. & Kunde, A. (2016). Tuned in emotion regulation program using music listening: Effectiveness for adolescents in educational settings. *Frontiers in Psychology 7*. 10.3389/fpsyg.2016.00859.

Dubois, J., & Adolphs, R. (2015). Neuropsychology: how many emotions are there? *Current Biology, 25*(15), R669-R672.

Dyment, A. (2014) I got you. (Recorded by Duke Dumont) *On I got you* [MP3 file]. Retrieved from https://open.spotify.com/track/4r8hRPbidDIoDPphxi78aY?si=xB6FHsCcTTuEuJz5ZY_1ng

Egermann, H., & McAdams, S. (2013). Empathy and emotional contagion as a link between recognized and felt emotions in music listening. *Music Perception: An Interdisciplinary Journal, 31*(2), 139-156.

Eerola, T., & Vuoskoski, J. K. (2013). A review of music and emotion studies: Approaches, emotion models, and stimuli. *Music Perception: An Interdisciplinary Journal, 30*(3), 307-340.

Ellis, C. (1999). Heartful autoethnography. *Qualitative Health Research, 9*(5), 669–683. https://doi.org/10.1177/104973299129122153

Facebook (2019, July 31). Your commitments to Facebook and our community. In Terms of Service (section 3). Retrieved September 11, 2019, from https://www.facebook.com/terms.php

Gelman, D. L. (2014). *Design for kids: Digital products for playing and learning*. Rosenfeld Media.

Goodwin, K. (2011). *Designing for the digital age: How to create human-centred products and services*. John Wiley & Sons.

Greenwood. C. (2016) *Burn the witch*. (Recorded by Radiohead). On a moon-shaped pool [MP3 file] Retrieved from Spotify:track:3pcCifdPTc2BbqmWpEhtUd

Grekow, J. (2018). *From content-based music emotion recognition to emotion maps of musical pieces.* Springer International Publishing.

Hallam, S., Cross, I., & Thaut, M. (Eds.). (2011). *Oxford handbook of music psychology*. Oxford University Press.

Hirsch, L. E. (2012). *Music in American crime prevention and punishment*. University of Michigan Press.

Holck, U., & Geretsegger, M. (2016). Musical and emotional attunement-unique and essential in music therapy with children on the autism spectrum. In *Proceedings of the 10th European Music Therapy Conference 25*(S1), pp. 34-35.

Hourcade, J. P., Williams, S. R., Miller, E. A., Huebner, K. E., & Liang, L. J. (2013, April). Evaluation of tablet apps to encourage social interaction in children with autism spectrum disorders. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 3197-3206). ACM.

Hughes, C. (2015). *Autism, hypersensitivity to noise and sensory processing*. Restored Hearing. Retrieved from https://restoredhearing.com/2015/11/20/autism-hypersensitivity-to-noise-and-sensory-processing/

Interaction Design Foundation. (2020). Design thinking: A non-linear process [image]. Retrieved from: https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process

Juslin, P. N. (2019). *Musical emotions explained: Unlocking the secrets of musical affect*. Oxford University Press.

Kamaruzaman, M. F., Rani, N. M., Nor, H. M., & Azahari, M. H. H. (2016). Developing user interface design application for children with autism. *Procedia-Social and Behavioural Sciences 217*(1), 887-894.

Kim, J., Wigram, T., & Gold, C. (2009). Emotional, motivational and interpersonal responsiveness of children with autism in improvisational music therapy. *Autism, 13*(4), 389-409.

Levitin, D. J. (2006). *This is your brain on music: The science of a human obsession.* Penguin.

Magee, W. L. (2006). Electronic technologies in clinical music therapy: A survey of practice and attitudes. *Technology and Disability, 18*(3), 139-146.

McIntosh, P. (2010). *Action research and reflective practice: Creative and visual methods to facilitate reflection and learning*. Routledge.

McNiff, J. (2009). *You and your action research project*. Routledge.

Miller, C. Z. (2014). Lost in translation? Ethics and ethnography in design research. Journal of Business Anthropology, 62-78

Momentous Institute (2015) *Settle your glitter*. Retrieved from https://www.youtube.com/watch?v=PSKLuV8rGAI

Nadel, S., & Baker, T. (1930). The Origins of Music. *The Musical Quarterly, 16*(4), 531-546. Retrieved September 8, 2020, from http://www.jstor.org/stable/738618

National Statement on Ethical Conduct in Human Research 2007 (Updated 2018). The National Health and Medical Research Council, the Australian Research Council and Universities Australia. Commonwealth of Australia, Canberra

North, A. C., & Hargreaves, D. J. (1997). Music and consumer behaviour. In D. J. Hargreaves and A. C. North (Eds.), *The social psychology of music* (pp. 268–282). Oxford: Oxford University Press.

Ocean IT. (2019) *Design thinking*. Retrieved from https://www.oceanit.com/services/design-thinking

Orzabal. R. (1982) Mad world (Recorded by Gary Jules) *On Trading snakeoil for wolftickets* [MP3 file]. Retrieved from Spotify:track:3JOVTQ5h8HGFnDdp4VT3MP

Plutchick, R. (1980, 2001). Putting some emotion into your design: Plutchik's wheel of emotions. Retrieved from https://www.interaction-design.org/literature/article/putting-some-emotion-into-your-design-plutchik-s-wheel-of-emotions

Quintin, E. M., Bhatara, A., Poissant, H., Fombonne, E., & Levitin, D. J. (2011). Emotion perception in music in high-functioning adolescents with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 41*(9), 1240-1255.

Radocy, R. E., & Boyle, J. D. (2012). *Psychological foundations of musical behavior*. Charles C Thomas Publisher.

Riekert. P. (1996) *Kiss the machine* (Recorded by Battery 9. [MP3 file] Retrieved from Spotify:track:067AwLFO7XkninBiXvvkBF

Schellenberg, E. G., Corrigall, K. A., Ladinig, O., & Huron, D. (2012). Changing the tune: listeners like music that expresses a contrasting emotion. *Frontiers in Psychology*, *3*(1), 574.

Schneck, D. J., & Berger, D. S. (2005). *The music effect: Music physiology and clinical applications*. London: Jessica Kingsley Publishers.

Stanford d.school. (2017). Design thinking [Image]. Retrieved from https://medium.com/@philmichaels/5-components-to-design-thinking-by-stanford-d-school-48dd111bbbe5

Sunderland, N., Lewandowski, N., Bendrups, D., & Bartleet, P. D. B. L. (2018). *Music, Health and Wellbeing*. Springer.

Swaminathan, S., & Schellenberg, E. G. (2015). Current emotion research in music psychology. Emotion Review, 7(2), 189-197.

Tan, M., & Khetrapal, N. (2016). Music inspired framework for remediating emotional deficits in autism. *Procedia Computer Science*, *88*(1), 469-474.

Travis, D., & Hodgson, P. (2018). What is design ethnography? Retrieved from https://www.userfocus.co.uk/articles/what-is-design-ethnography.html

Yang, M. C. (2005). A study of prototypes, design activity, and design outcome. *Design Studies*, *26*(6), 649-669.

Appendix A: Glossary of Terms

This page provides a quick reference guide to the terminology used throughout this research. Its purpose is to clarify the use of terms and establish consistency of meaning with regards to new or contestable terminology.

ASD	Autism Spectrum Disorders are brain conditions that result in people learning in a different way to others. They might face challenges in how they recognise and respond to things and how they respond to emotions. People living with autism may be non-verbal or may talk a lot, and their senses might respond differently to those of other people. For example, someone living with autism might hate touching things – or they might love touching things that they shouldn't. (Novita, 2019)
Adobe	A software development company that creates industry-standard popular design and illustration programs like Photoshop and Illustrator.
DAW	Digital Audio Workstation – software program used to edit, arrange and mix audio content.
Neurodivergent	A term for people who display non-neurotypical behaviours and may have had a diagnosis.
Ableton	the DAW I used for music production
UX	The user experience (UX) is what a user of particular product experiences when using that product
UI	The user interface (UI) is everything designed into an information device with which a person may interact.
Cookie	A small bit of information that travels from a browser to a web server.
Musical Scale	A scale is a sequence of small intervals - in Western music, those intervals are usually tones (whole steps) and semi-tones (half steps).
Musical chords	A chord, in music, is any harmonic set of pitches consisting of multiple notes (also called "pitches") that are heard as if sounding simultaneously
Diminished chords	Diminished chords, also known as diminished triads or dim chords, are dissonant chords that combine a root note with two minor thirds above the root.
Staccato	"Staccato" is a form of musical articulation. In modern notation, it signifies a note of shortened duration, separated from the note that may follow by silence.
Palm Mute	The palm mute is a playing technique for guitar and bass guitar, executed by placing the side of the picking hand below the little finger across the strings to be plucked, very close to the bridge, and then plucking the strings

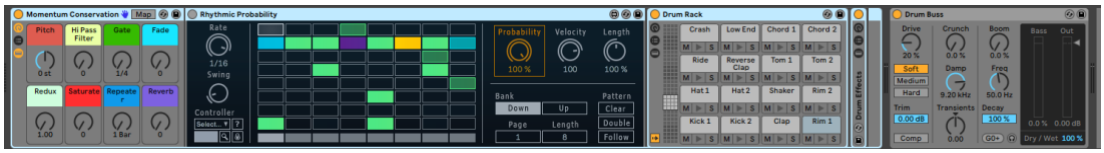
	while the damping is in effect. This produces a muted sound and is also referred to as a "Chug."
Push 2 Controller	Midi controller designed for Ableton that allows for full integrated tactile interaction without using a keyboard or mouse.
Heavy Metal	Heavy metal (or simply metal) is a genre of rock music that developed in the late 1960s and early 1970s, largely in the United Kingdom. With roots in blues-rock, psychedelic rock, and acid rock, the bands that created heavy metal developed a thick, massive sound, characterised by highly amplified distortion, extended guitar solos, emphatic beats, and overall loudness. The genre's lyrics and performance styles are sometimes associated with aggression and machismo.
Industrial Music	Industrial music is a genre of music that draws on harsh, transgressive or provocative sounds and themes. AllMusic defines industrial music as the "most abrasive and aggressive fusion of rock and electronic music" that was "initially a blend of avant-garde electronics experiments (tape music, musique concrète, white noise, synthesisers, sequencers, etcetera) and punk provocation."

Appendix B: Original Musical Elements

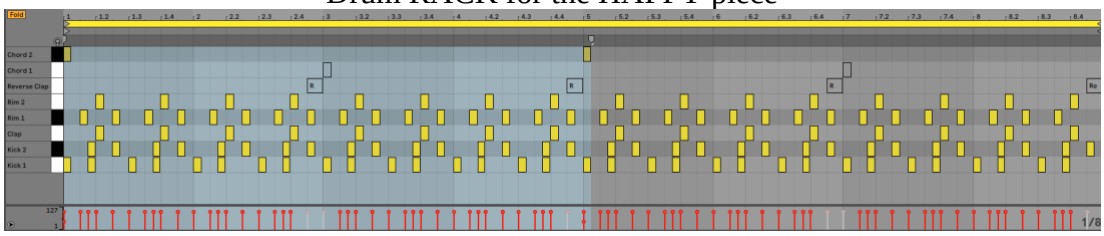
This section provides screenshots of the Instruments, Midi, audio waveforms and effects chains of the different elements that make up the compositions within the musical component of this project.

Happy

Drums



Drum RACK for the HAPPY piece



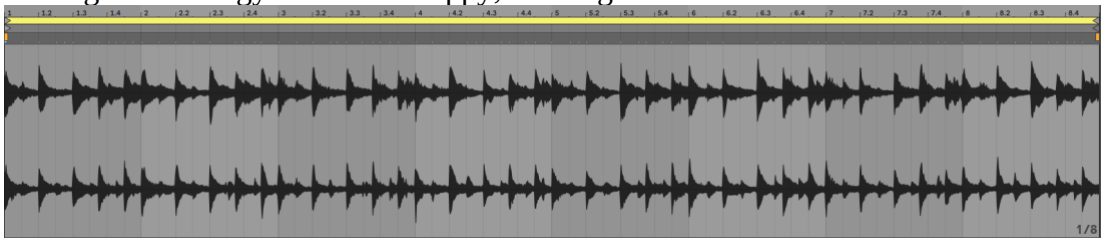
Drum rack -MIDI programming for ‘happy.’

Drum loop

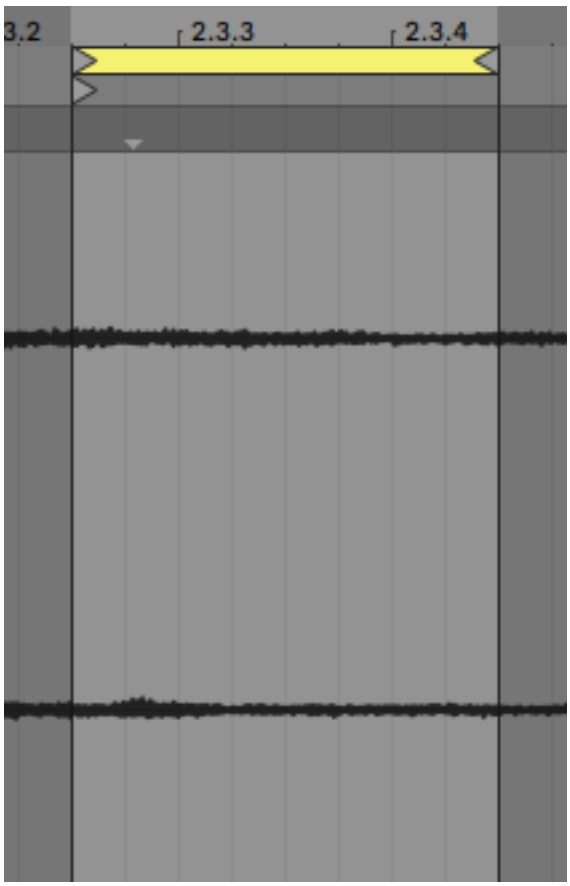
High hat loop

Lead

The first chord progression is used as the main melodic element, with the second loop creating more energy to create a happy, exciting aesthetic.



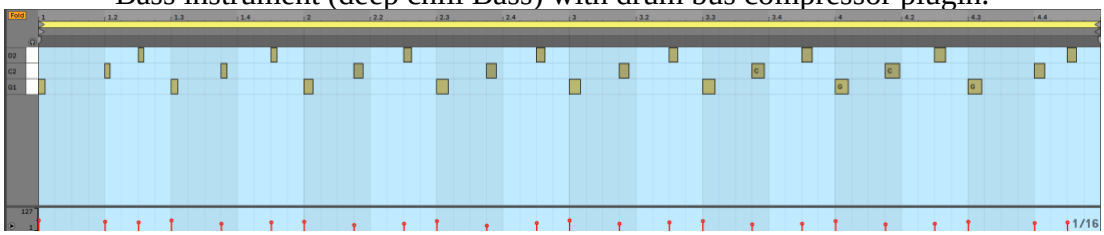
Tropics chord progression in C (100bpm)



A snippet of synth chord stab (94bpm)

Bass

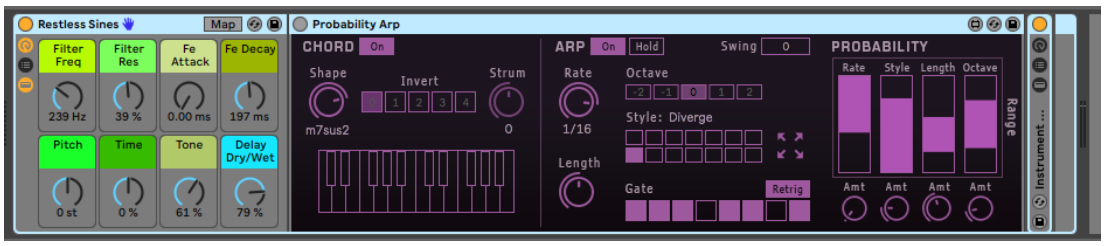
Bass instrument (deep chill Bass) with drum bus compressor plugin.



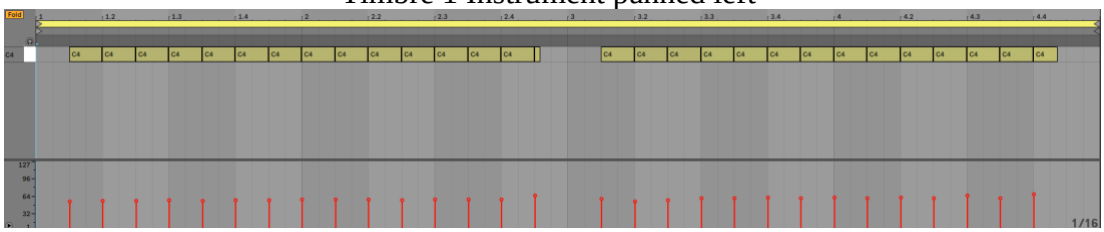
MIDI programming for Bass in C major

Timbre

I used some arpeggiated high register notes to create a happy tone and decided to create two versions and pan them slightly left and right to create a wider stereo image and movement.

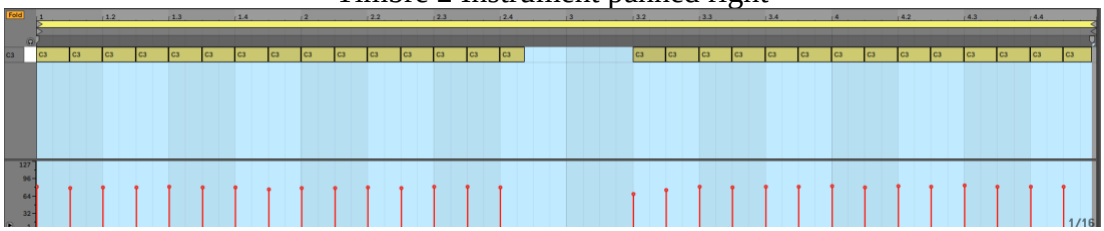


Timbre 1 Instrument panned left



Timbre 1 MIDI programming

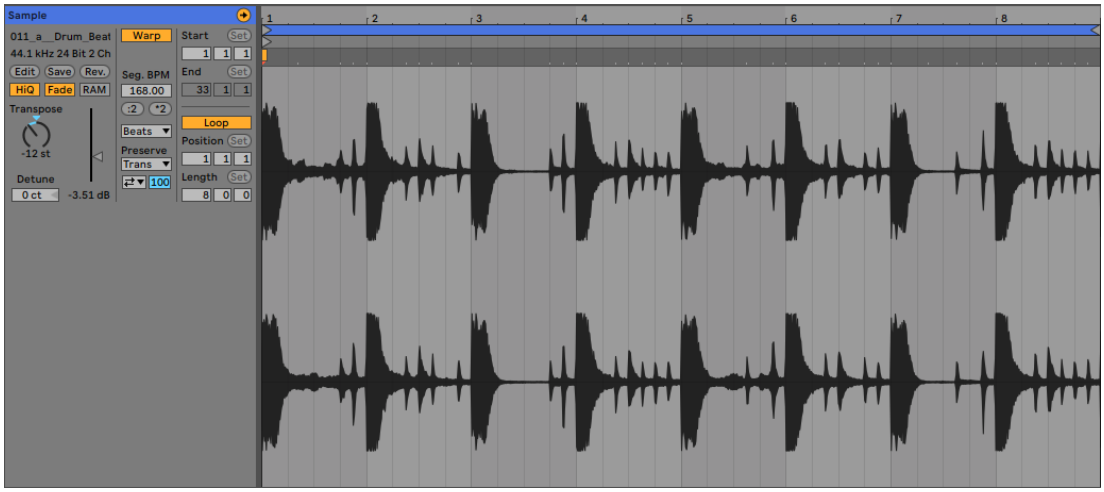
Timbre 2 Instrument panned right



Timbre 2 MIDI Programming

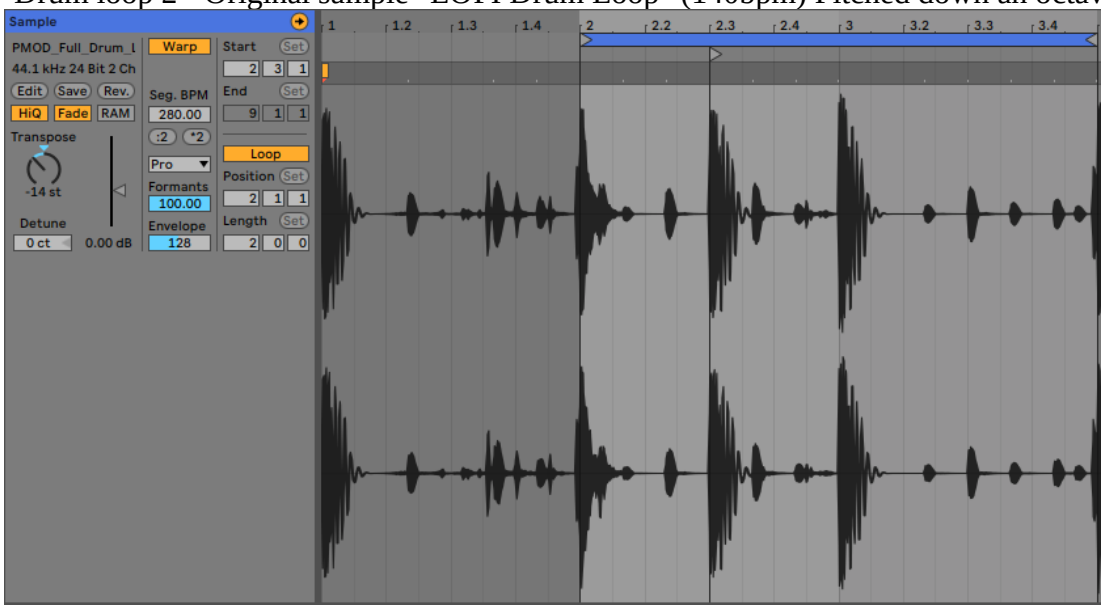
Sad

Drums



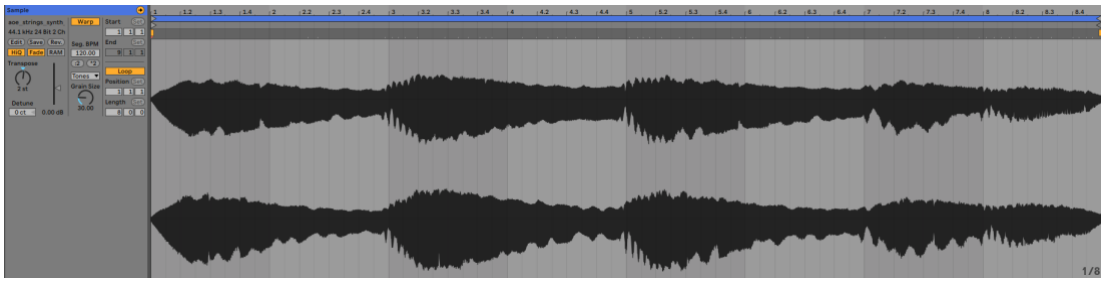
Drum Loop 1 - pitched down an octave

Drum loop 2 - Original sample "LOFI Drum Loop" (140bpm) Pitched down an octave



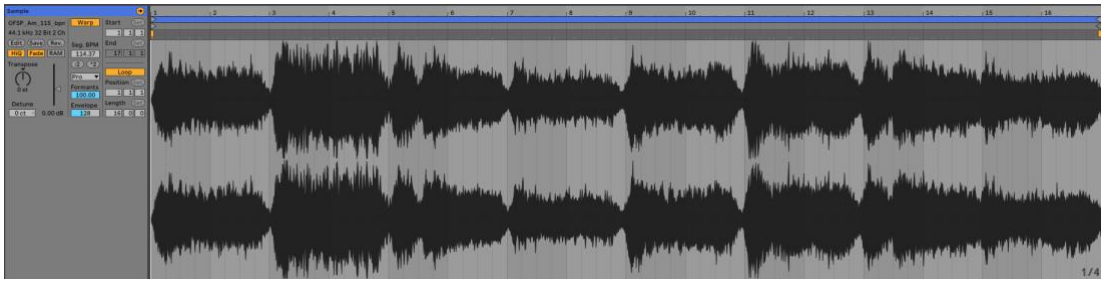
Drum loop 3 - Original sample "PMOD Full loop 07" (140bpm) Pitched down 14 semitones

Bass



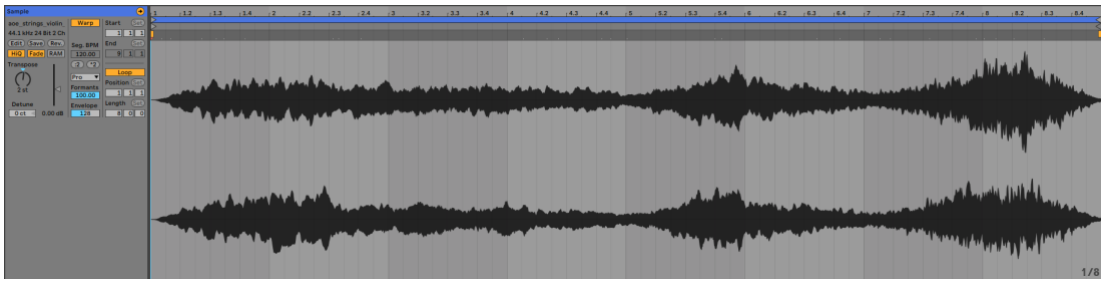
Bass - Original sample "Sad cello 1" in G-minor (128bpm) pitched up to A-minor

Lead



Lead - Original sample "Saddest chord progression ever" A min (115bpm)

Timbre



Timbre Layer 1 - Original sample "sad cry" in G min (120bpm) pitched to A min

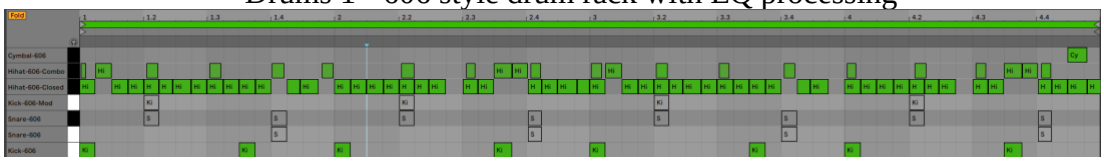
Timbre Layer 2 - Original sample "Sad Cello 2" in G min (120bpm) pitched to A min

Worried

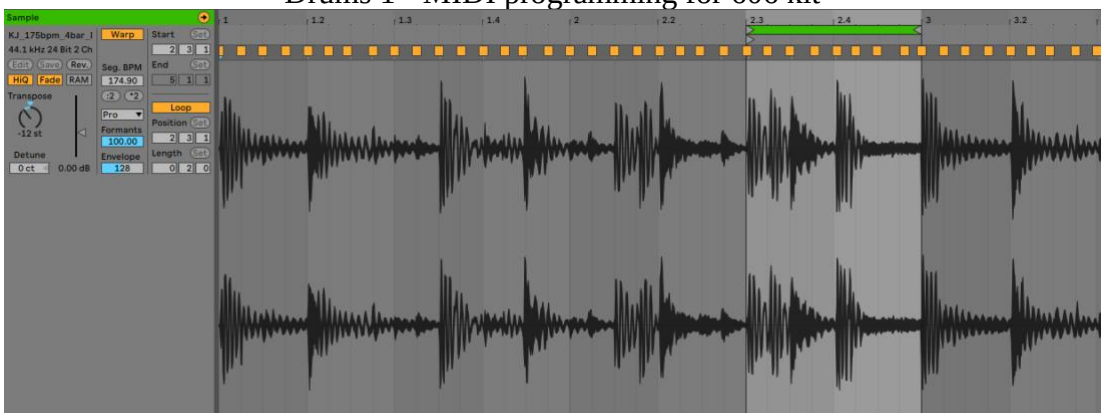
Drums

Drums - Drum buss processing using the Drum Buss plugin.

Drums 1 - 606 style drum rack with EQ processing



Drums 1 - MIDI programming for 606 kit



Drums 2 - Original Sample "Deep Kit Jungle" (175bpm) pitched down an octave

Drums 3 - Original Sample "Nervous" (120bpm)

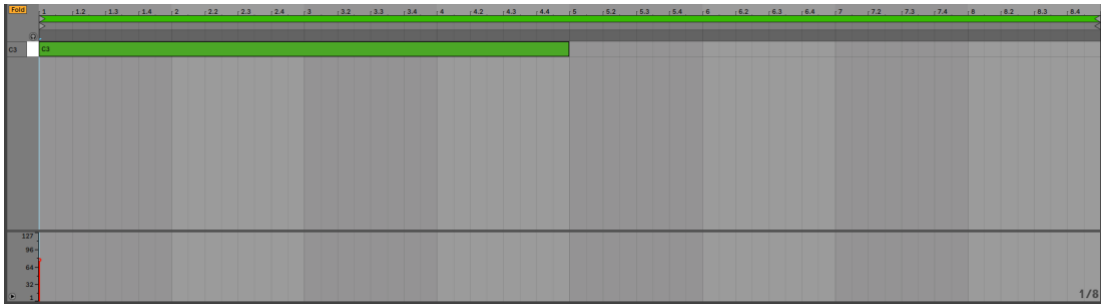
Bass

Bass Instrument "Better Bounce Bass"

Bass MIDI Programming for Instrument

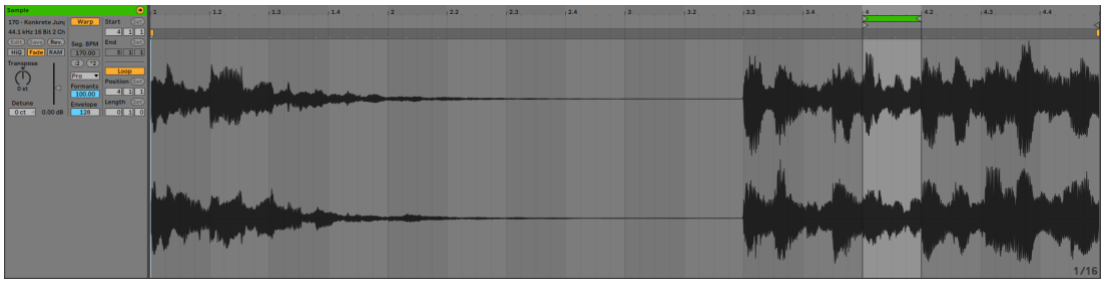
Lead

Lead instruments and effects chain



Lead MIDI programming for Instrument

Timbre



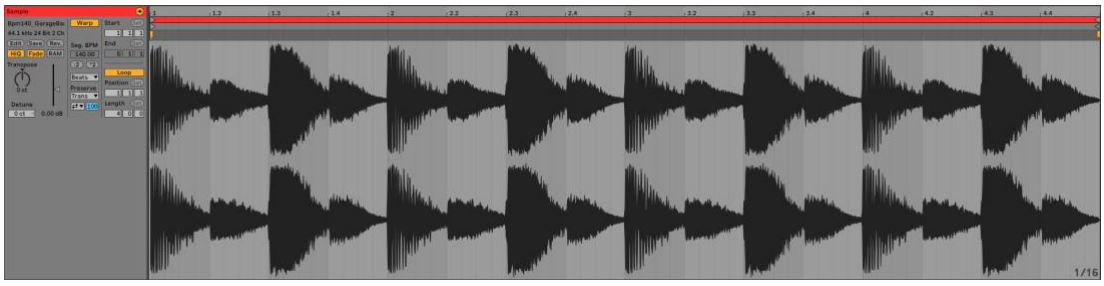
Timbre 1 -Original sample "Concrete Jungle Synth" A min (170 bpm)

Timbre 1 - Soundtoys Crystallizer plugin inserted on the audio sample

Timbre 2 - Original Sample " Nervous 02" G min (124bpm) pitched to A min

Angry

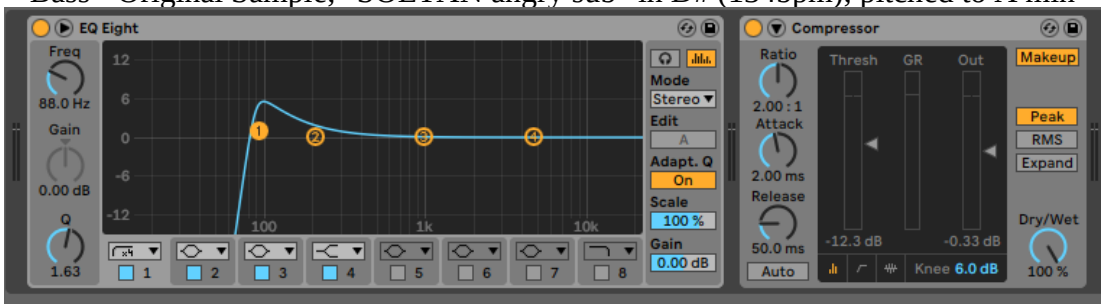
Drums



Drums - Original Sample " Garage band "(140bpm)

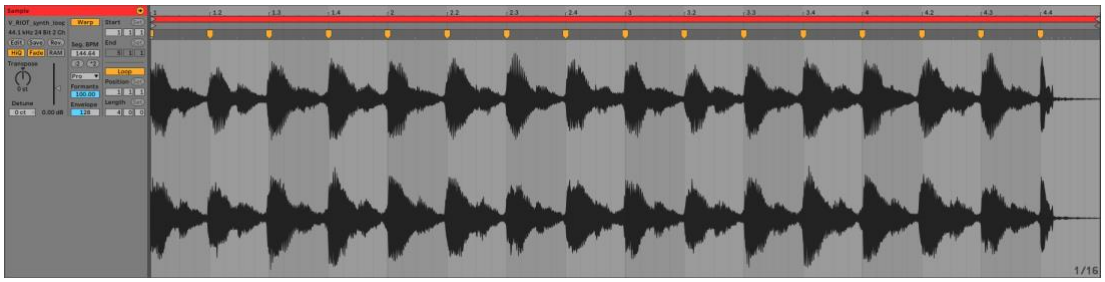
Bass

Bass - Original Sample, "SOLTAN angry sub" in D# (134bpm), pitched to A min



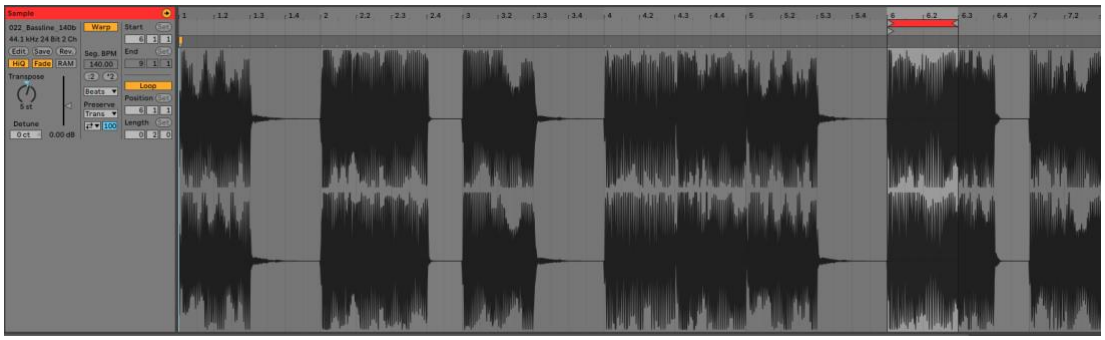
Bass - EQ and Compression settings

Lead

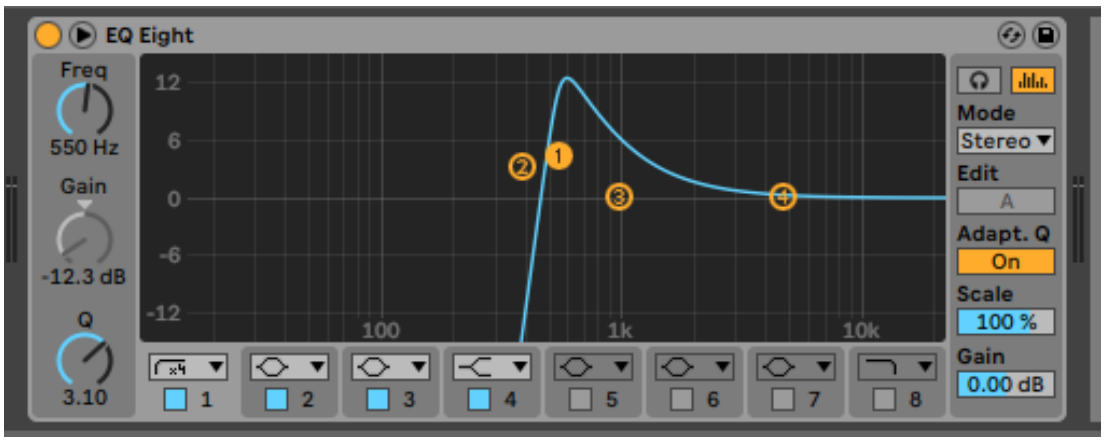


Lead - Original Sample " Angry Cello - Synth loop" in F (145bpm)

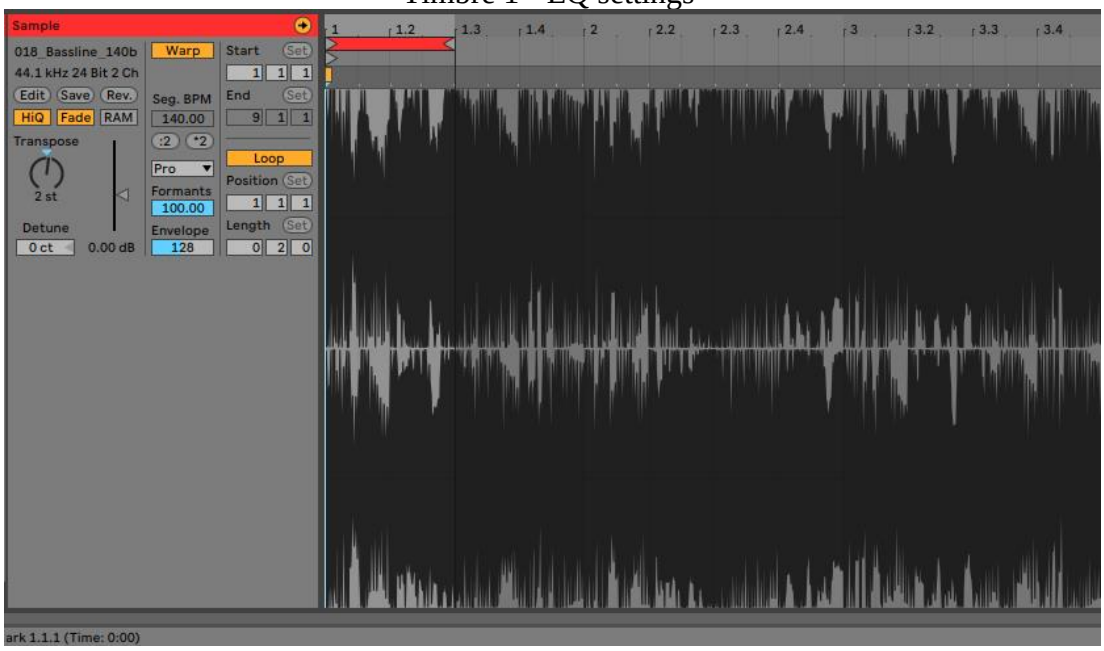
Timbre



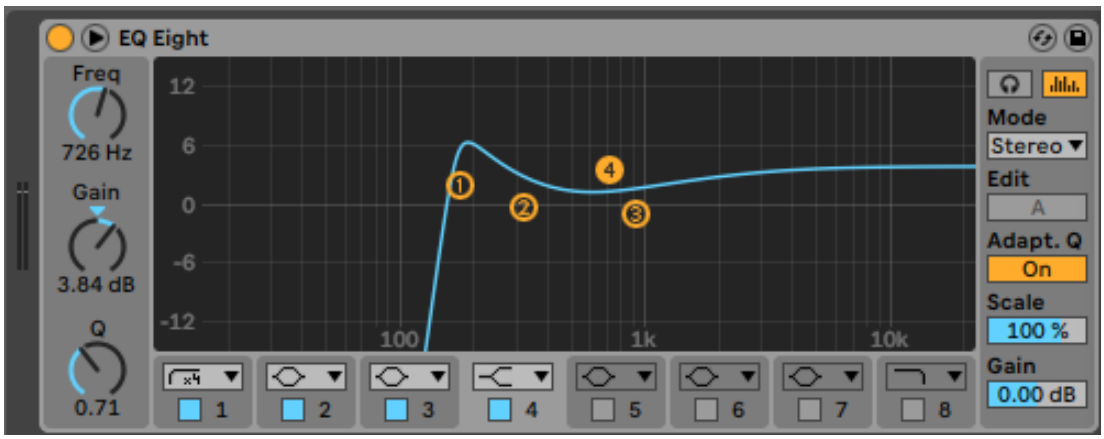
Timbre 1 - Original Sample, " 22 Zenhiser Bassline" in E (140bpm), Pitched up to A min



Timbre 1 - EQ settings

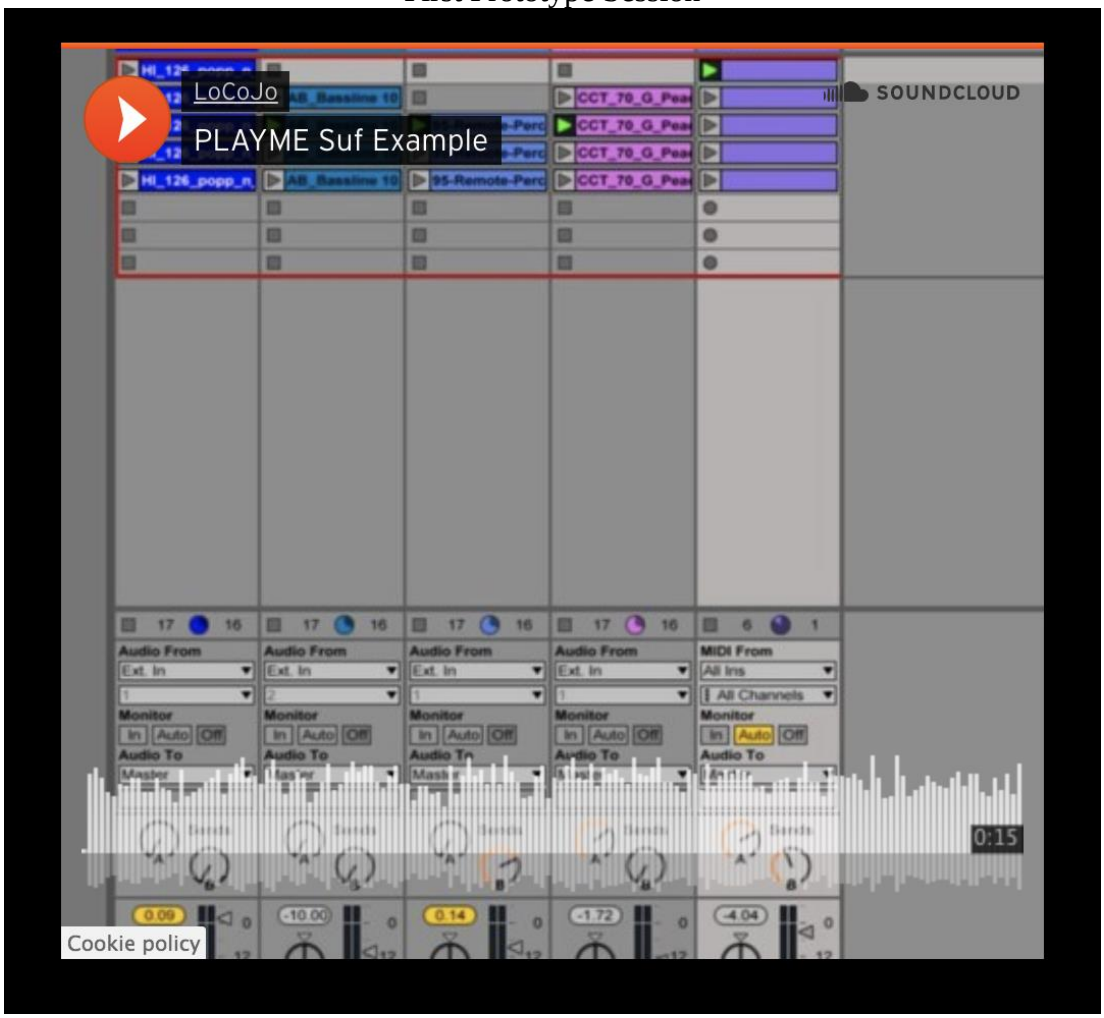


Timbre 2 - Original Sample " 18 Zenhiser Bassline" in G (140bpm) Pitched up to A min



Timbre 2 - EQ Settings

First Prototype Session



First Prototyping and interaction experiment

Appendix C – Privacy Policy

PRIVACY POLICY FOR WEBSITE

www.hookgen.com/mymusictime

Effective Date: 01/08/2019

This privacy policy (hereinafter "Privacy Policy") deals with the protection of Your privacy while You use Our website, which is hereinafter referred to as "the Product" and which is located at: www.hookgen.com/mymusictime

The Product is owned and operated by: Johannes Dreyer

We are committed to the protection of Your privacy while You use the Product.

This Privacy Policy only applies to the Product. The Product may contain links to other websites or applications, but if that is the case, the Privacy Policy does not apply to any of those linked websites or applications.

We gather certain information from users of the Product, so this Privacy Policy explains what information we collect, how we use it, and your rights in relation to it.

By continuing to use the Product, You acknowledge that You have had the chance to review and consider this Privacy Policy, and You acknowledge that You agree to it. This means that You also consent to the use of Your information and the method of disclosure as described in this Privacy Policy. If You do not understand the Privacy Policy or do not agree to it, then please do not use the Product.

1. DEFINITIONS

"Company IP" includes, but is not limited to, the contents, layout, design, colours, appearance, graphics and imagery of the Website, Content and Materials as well as all copyrights, trademarks, trade secrets, patents and other intellectual property contained in the Product, Content and Materials.

"Content" means any content, writing, images, audiovisual content or other information published on the Product.

"Effective Date" means the date that this Privacy Policy comes into force.

"Items" means any and all of the Product, Content and Materials collectively.

"Materials" means any materials, information or documentation that We may provide to You in connection with Your use of the Product including documentation, data, information developed by Us or owned by Us, and other materials which may assist in Your use of the Product.

"Parties" means both You (the user of the Product) and Us (the owner of the Product) collectively.

"Personal Information" means information that we obtain from You in connection with Your use of the Product.

"Privacy Policy" means this privacy policy.

"Product" means the website including all pages, all subpages, all blogs, all forums, all other connected pages and all other connected internet content whatsoever, the home page or main page of which is located at: www.hookgen.com/mymusictime

"Third-Party Links" means links or references to websites other than the Website, to content other than the Content or to materials other than the Materials, none of which are controlled by Us.

"Us", "We", "Our" or "*the Owner"* refers to Johannes Dreyer

"Us", "We", "Our" or "*the Owner"* also includes any employees, affiliates, agents or other representatives of Johannes Dreyer

"You" or *"Your"* refers to the user of the Website.

"Your Content" means any Content posted to or added to the Website, Content or Materials by You or by somebody authorised by You or doing so on Your behalf.

2. INTERPRETATION

a. In this Privacy Policy, unless the context otherwise requires, the following rules of interpretation shall apply:

I. Words referring to one gender include every other gender.

II. Words referring to a singular number include the plural, and words referring to a plural include the singular.

III. Words referring to a person or persons include companies, firms, corporations, organisations and vice versa.

IV. Headings and titles are included in this Privacy Policy for convenience only and shall not affect the interpretation of this Privacy Policy.

V. Each Party must, at its own expense, take all reasonable steps and do all that is reasonably necessary to give full effect to this Privacy Policy and the events contemplated by it.

VI. Any obligation on a Party not to do something includes an obligation not to allow that thing to be done.

3. TYPE OF INFORMATION AND HOW IT IS COLLECTED

a. When You use the Product, We may collect information from You through automatic tracking systems (such as information about your browsing preferences).

b. In addition, We may collect information that You volunteer to Us (such as information that You provide during a sign-up process or at other times while using the Product).

c. In order to access some specific features of the Product, You are required to provide some Personal Information. During this process, We collect some of Your Personal Information in the following manner:

I. We will not collect information that identifies You personally, except when You specifically volunteer that information to Us when using specific Product features. These specific Product features might include, but are not limited to:

A. The emotional reflection followed by the interaction with the musical loops and the post reflections are recorded,

II. In addition to any Personal Information that You are required to provide in order to access these additional Product features, in some cases, You may be required to provide more specific information. For example, in order to make purchases, You may need to provide credit card information, billing information and postal addresses.

4. COOKIES

a. Cookies are small files stored on Your computer or mobile device which collect information about Your browsing behaviour.

b. Cookies do not access information that is stored on Your computer.

c. Cookies enable us to tailor our configurations to Your needs and preferences in order to improve Your user experience.

d. Most internet browsers accept cookies automatically, although You are able to change Your browser settings to control cookies, including whether or not You accept them and how to remove them. You may also be able to set Your browser to advise You if You receive a cookie or to block or delete cookies. However, if You do this, You may be prevented from taking full advantage of the Product.

5. HOW YOUR INFORMATION IS STORED

a. Please note that no systems involving the transmission of information via the internet, or the electronic storage of data, are completely secure. However, we take the protection and storage of Your Personal Information very seriously. We take all reasonable steps to protect Your Personal Information.

b. We use appropriate physical, digital, managerial and security systems to store Your Personal Information and to protect it against unauthorised access, destruction or disclosure.

6. COMBINING INFORMATION

a. We do not combine, link or aggregate any of Your Personal Information with other Personal Information of Yours which We are holding.

7. HOW YOUR INFORMATION IS USED

a. We use Your Personal Information to help us improve your experience with Our Product.

8. VULNERABLE USERS

a. We may collect information from specific categories of users who may be particularly vulnerable, including children

b. Information collected from vulnerable users in accordance with this clause is collected for the purpose of:

The purpose of the App is to measure the emotional effect the interaction with music could facilitate with school-aged children

c. Information collected from vulnerable users in accordance with this clause is collected, used, and if applicable, disclosed in the following circumstances and in accordance with the following procedure:

The interaction with the musical creation over a minute session will be recorded

9. ADDITIONAL PROVISIONS REGARDING COLLECTION, USE AND STORAGE

a. In addition, We may deal with Your Personal Information in the following specific circumstances:

We only gather the age range and timezone of participants

10. MERGER, RESTRUCTURE OR SALE OF OUR BUSINESS

a. Part or all of Our business may be merged, restructured or sol,d including but not limited to through an ordinary sale of business or of stock, a corporate reorganisation, a change in control, bankruptcy or insolvency proceedings.

b. In the event that such a merger, restructure, or sale occurs as described in the preceding sub-clause hereof; We may transfer Your Personal Information,

including personally identifiable information, as part of that merger, restructure or sale.

11. ACCESSING, UPDATING AND CORRECTING YOUR PERSONAL INFORMATION

a. You have the right to request access to any of Your Personal Information which We are holding.

b. You have the right to request that any of Your Personal Information which We are holding be updated or corrected.

c. In order to request access, an update or a correction to Your Personal Information, you may contact us using the details at the end of this Privacy Policy.

d. In addition, You should use the following procedure in order to request access or correction to Your Personal Information:

Contact the owner, stating the dates and times the app was used, and all that information will be made available.

12. DISCLAIMER REGARDING SECURITY

By continuing to use the Product, You agree to the terms of this Privacy Policy. You acknowledge, agree and accept that no transmission of information or data via the internet is completely secure. You acknowledge, agree and accept that We do not guarantee or warrant the security of any information that You provide to Us and that You transmit such information at Your own risk.

13. CHANGES TO THIS POLICY

a. We may make changes to this Privacy Policy at any time in Our sole discretion.

b. If We make changes to this Privacy Policy, unless We obtain Your express consent to those changes, then such changes will only apply to any information that We obtain from You after the date that the changes take effect.

c. If We make changes to this Privacy Policy, Your continued use of the Product after the date that the changes take effect confirms that You acknowledge, accept and agree to those changes.

14. COMPLAINTS

a. We take customer satisfaction very seriously. If You have a complaint in relation to Our handling of Your Personal Information, We will endeavour to handle it promptly and fairly. For Your information, an overview of Our complaints handling procedure is as follows:

I. Please contact the owner if you have any questions or concerns

II. All complaints should be provided in writing either by email or regular mail, using the contact details at the end of this privacy policy. Describe the nature of your complaint including any relevant dates, people involved, any consequences that have occurred, and what you believe should be done to rectify the issue. We will endeavour to respond within 21 days, although we cannot guarantee this.

III. If You are not satisfied with Our response to Your complaint, You may refer your complaint to the relevant external dispute resolution organisation in Your area.

15. CONTACT US

You can contact Us about this Privacy Policy using the following details:

Johannes Dreyer
Beatfrequency Mentoring
johann@beatfrequency.com.au