

Johannes Andersen Rønning

AUGMENTING CREATIVITY

Artistic research into the cognitive processes
behind creativity in music production

Master's thesis in Creative Music Technology

Supervisor: Daniel Buner Formo

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Faculty of Humanities
Department of Music



Sammendrag

I denne oppgaven forsøker jeg å forbedre min egen kreativitet og produktivitet i forbindelse med musikkproduksjon, ved å undersøke og utforske de kognitive prosessene bak kreativitet, med *to-prosessteorien* (engelsk: «Dual process theory») som teoretisk rammeverk. Ved å relatere denne teorien til historisk arbeid rundt musikalsk kreativitet og personlig erfaring/eksperimentering, presenterer jeg to resultater: Det første er en foreslått liste med *kreative påvirkere*, en liste over måter å modifisere kreative prosesser til å basere seg på spesifikke typer kreativitet, og det andre er et album med 6 låter som ble produsert som en del av det utforskende arbeidet rundt de kreative påvirkerne. Disse to resultatene danner sammen et helhetlig bilde av hvordan de forskjellige typer kreativitet omtalt av to-prosessteorien kan oppmuntres, i tillegg til hvordan de kan påvirke musikkens estetikk.

Abstract

In this thesis, I aim to improve my own creativity and productivity when producing music by researching and exploring the cognitive processes behind creativity, using *dual process theory* as a theoretical framework. By relating this research to historical work on musical creativity, and personal experience/experimentation, I present two results: The first is an overview of *creative augmenters*, a list of ways to modify creative processes to encourage a certain type of creativity, and the second is an album of 6 songs/tracks that I made while exploring/researching the creative augmenters. The two results form a cohesive showcase of how the different types of creativity outlined by dual process theory can be encouraged, as well as how they may effect the aesthetics of the music.

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1 Introduction

1.1 Motivation and goal

I have been creating/producing music for almost 12 years. During this time, I have amassed knowledge, skills, and experience from formal music education, self-directed learning via digital platforms such as YouTube, and extensive periods of creative experimentation. Despite having all the expertise and equipment needed to create music, I have felt that it somehow got harder and harder to get into creative flow and feel inspired as time passed by, resulting in almost no new music being created in the last years.

The goal for this thesis is first and foremost to improve my own creativity. There are potentially many ways to “get creative”, and there is no shortage of articles and videos online that claim to fix creative issues through various means. However, I know from personal experience that I am best at fixing a problem if I can understand the root cause of it. I believe I can discover the root causes of my own creative struggles by exploring and systematizing the cognitive processes underlying creative thinking (within the context of music production), in turn building a better understanding of my own cognitive patterns during creative processes. Through this research, I hope to figure out concrete techniques to encourage creative thinking, that may help me get unstuck and increase productivity.

My bachelor’s thesis “Å finne inspirasjon” (“Finding inspiration” in English) (Rønning, 2021) had a similar outline, and as such this master’s thesis can be seen as a continuation of it. Compared to my bachelor, this master’s thesis aims to establish a deeper understanding of the underlying creative processes in music production and present them in a way that can be more applicable to other artists and creative fields.

The thesis’ research statement can be summarized like this:

“Improving creativity and productivity by exploring the cognitive processes underlying music production, using dual process theory as a model”.

1.2 Method for research

As creative music production is made up of many different types of creative work (like composing, playing, producing, and mixing), a model or framework is needed to properly categorize and systematize the underlying processes. As my framework for analysis, I have chosen *dual process theory* - a neuropsychological theory that separates subconscious (spontaneous) and conscious (deliberate) thought as two separate processes/systems, used in this thesis to differentiate between spontaneous and deliberate creativity. I picked this particular theory as it closely aligns with a personal pre-existing idea of mine that there are two types of creativity: Inspired and technical¹.

¹ Inspired creativity occurs randomly and automatically, while technical creativity is instigated purposefully. Inspired and technical creativity closely relates to *spontaneous* and *deliberate* creativity, respectively, as presented in this thesis.

It is used as a model to analyse relevant historical work on creativity in music as well as my own music production process, to discover and experiment with specific ways to encourage spontaneous and deliberate creativity.

The results of this experimentation are two-fold; I have developed a set of proposed *creative augmenters* that may be used to alter creative processes by encouraging specific types of creativity, as well as a music album, "one_eighty", containing 6 songs/tracks that showcase the augmenters' use cases and effects on productivity and aesthetics. The two results have been developed concurrently, meaning that my music has served both as testing grounds for experimenting with specific augmenters, as well as provide practical insight that has been used to further develop the augmenters. In this sense, the two results of the thesis are products of each other, being slowly built up and refined through "circular" experimentation.

As making only one genre or type of music would potentially give more skewed or biased results (as certain genres may rely more on certain types of creative processes), I have purposefully tried to create as varied music as possible; the album contains 6 songs/tracks ranging from vocal pop, to lofi hiphop, to experimental heavy electronic, to disco.

2 The spontaneous and deliberate mind

To improve both the quality and quantity of my creative output, I believe it is important to first understand *how* creativity works on a more fundamental level, in this case by exploring the neuropsychological processes behind creativity and how to encourage them. Through analysing the core mechanics of the creative mind, it should be possible to discover new or different techniques that might make it easier to create in the future. Creativity is, of course, a very complex phenomenon involving the cooperation of several networks and parts of the brain, meaning I have to simplify/limit some of the theory framework. For this thesis, I have chosen *dual process theory* as a model through which I will analyse and explore creativity.

2.1 Dual process theory

In psychology, dual process theory suggests that thoughts can arise from two separate processing modes in the brain: the spontaneous processing mode used for subconscious, automatic processing, and the deliberate processing mode used for conscious, focused processing. It explains how certain types of thought/ideas seemingly present themselves without effort or intent (intuition), while others may require focus and reasoning (Evans, 2003, pp. 2-7). The two processing modes both have their own use cases, strengths, and weaknesses, which will be presented below:

2.1.1 Spontaneous process

The spontaneous process, also referred to as "system 1" (Kahneman & Frederick, 2002, p. 3), the "type 1" (Allen & Thomas, 2011, p. 3), or "implicit" (Evans & Over, 1996, p. 10) process, occurs automatically, without deliberate control (subconsciously). It can influence attitudes, beliefs, and behaviours without conscious realisation (Evans, 2003, p. 456). There is no effort required for spontaneous thought, and as such it allows the brain to perform other tasks simultaneously without overload. It is fast and efficient, but prone to taking shortcuts and being affected by biases. This immediacy is beneficial for rapid response but often comes at the cost of accuracy. For example, when meeting someone for the first time, instant subconscious judgments about the person are made based on biases and stereotypes. Such heuristic-driven decisions can perpetuate stereotypes and lead to errors in judgment (Kahneman & Frederick, 2002, p. 5).

Most automatic or habitual tasks are processed by the spontaneous process, such as deciding what foot to put in front of the other when commencing a run or moving each finger to the appropriate string/fret when playing the guitar. Even though these actions may require focus and effort when performed for the first time, they are almost completely automatic when performed by a trained individual (Dietrich, 2004, p. 1019). A highly skilled guitarist may even be able to play entire songs or improvise solos without ever consciously thinking about finger placement, picking technique, chord names etc. With increasing experience/skill, more decisions such as these can be managed by the spontaneous process, enabling the performer's attention to be focused elsewhere (for example paying attention to other musicians, singing, dancing etc.).

2.1.2 Deliberate process

The deliberate process, also referred to as "system 2" (Kahneman & Frederick, 2002, p. 3), the "type 2" (Allen & Thomas, 2011, p. 3), or "explicit" (Evans & Over, 1996, p. 10) process, is the conscious mental process that we can control and are aware of. It is slow, logic based and critical, and encompasses activities such as reasoning, planning and decision-making. Unlike the spontaneous process that occur without our intentional control, deliberate thought requires cognitive effort and attention. It allows a person to process complex information, solve problems, and make informed decisions (Evans, 2003, p. 454). The deliberate process holds the ability to consciously manipulate information within the central working memory, which is a short-term memory bank that holds information that is relevant for the object/task in focus. The content of the central working memory is in other words all the information that one is consciously aware of at any point in time (Dietrich, 2004, p. 1017).

A study found the central working memory to only be able to hold around 4 different items at a time (Cowan, 2001). This number may increase with items that correlate and allow for "chunking" of information, and similarly, it may decrease to as little as a single item if the information is new or abstract (Cowan, 2001). Conscious thought is also further limited by the type of information is made available for it to process; perception filtering, attention, expectation, and cognitive bias all contribute to narrowing down the information that ends up in conscious attention, to avoid overwhelming the brain. The limited capacity of the central working memory combined with the difficulty of accessing "irrelevant" information makes forming novel associations and connections (thinking creatively, or "outside the box") difficult using deliberate thought (Dietrich, 2004, p. 1017).

2.1.3 Divergent, lateral and convergent thinking

Divergent, lateral, and convergent thinking are good examples on how to differentiate between the spontaneous and deliberate processes in the context of creativity. Divergent thinking is a creative process where the goal is to come up with as many different ideas or solutions as possible, often involving exploring unconventional solutions. This type of thinking is most notably deliberately employed through brainstorming, where an individual or a group are encouraged to put aside criticism and collect as many varied ideas as possible in a short time period (Guilford, 1956, p. 274).

Closely related to divergent thinking is "lateral thinking". While divergent thinking focuses on removing inhibitions with the aim to create multiple and varied ideas, lateral thinking is more specifically aimed at finding obscure solutions through viewing the problem in a new and unusual light. This is done by exploring reasoning and ideas that are not achievable through step-by-step logic, breaking away from conventional understanding (De Bono & Zimbalist, 1970). As this irrational, imaginative type of thought is most associated with the spontaneous process, both divergent and lateral thinking can be said to be facilitating spontaneous creativity. Popularly, these processes may be referred to as "thinking outside the box". In this case, "the box" refers to the cognitive constraints the working memory and perception filtering puts on deliberate creativity.

Conversely, convergent thinking is the creative process of narrowing down or reworking a broader, more general idea into something more concrete/specific. This can for example be used after divergent or lateral thinking to remove unfeasible solutions, rework ideas or to create concrete plans. As the working material (ideas) is already in the central

working memory (in focus), deliberate thought can effectively and precisely process the material, allowing for more goal-focused and determined work. In other words, convergent thinking can be explained as rational problem solving, or “thinking in the box” (Guilford, 1956, p. 274).

2.2 Knowledge domains in dual processes

In his article “The cognitive neuroscience of creativity” (Dietrich, 2004), Arne Dietrich proposed dividing the processing modes of creativity (spontaneous and deliberate) into two separate knowledge domains: Cognitive and emotional. This is based on theories that there is a different neural circuit, and therefore a different type of creativity, used when processing knowledge or emotions. Differentiating creativity based on knowledge from that based on emotion is undoubtedly helpful, both for discovering their qualitative differences and for assessing how individuals of varying cognitive capacity (skill, knowledge etc.) are able to utilise them. Based on Dietrich’s article, creativity can be divided into a total of four different types based on processing mode and knowledge domain:

2.2.1 Spontaneous-cognitive

Spontaneous-cognitive creativity is creative output from spontaneous processing, based on a pre-existing body of knowledge. This can be experienced as sudden revelations or epiphanies, where the subconscious has been processing knowledge that has prior been the focus of attention (a classic example is Isaac Newton’s “eureka” moment when observing apples falling from a tree) (Dietrich, 2004, p. 1019). In music, spontaneous-cognitive creativity is perhaps most used during improvised performance, where the choice of notes, chords, rhythm, voicings etc. will come intuitively to the performer in the moment (and these choices are based on knowledge of what works and what doesn’t). However, it can also be the source of sporadic hunches or associations that occur outside of improvisation, like when composing or producing music as well. As discussed in section 2.1.2, deliberate processing struggles to make connections to information outside of what the central working memory has deemed “relevant”; therefore, the spontaneous-cognitive creativity is also the primary source of “outside-the-box”-creativity, where connections to seemingly irrelevant information has been used to generate ideas.

2.2.2 Spontaneous-emotional

Spontaneous-emotional creativity is creative output from spontaneous processing, using emotions and momentary impressions - meaning sudden creative impulses that is based on how an impression feels. This type of creativity occurs when the output cannot be the result of processing knowledge or experience, such as intuitive responses when facing unfamiliar or irrational situations. In this way, the spontaneous-emotional creativity comes from our most primal form of thought; intuitive impulses/hunches derived from emotion (Dietrich, 2004, pp. 1019-1020).

As completely removing oneself from knowledge or experience is near impossible, it is difficult to define specifically when spontaneous-emotional creativity occurs in music-related fields. However, it is likely somewhat prevalent in improvised avant-garde music and performing arts, where an artist might attempt to remove all reasoning, conventions and logic from their performance and instead channel emotional responses.

2.2.3 Deliberate-cognitive

Deliberate-cognitive creativity is creative output from deliberate processing of knowledge, characterised by systematic and focused work (Dietrich, 2004, pp. 1018-1019). This type of creativity is most associated with technical tasks and problem solving that require focused evaluation and consideration of specific information, such as mixing/mastering audio or cutting/editing video. The reason these tasks use mostly deliberate-cognitive creativity is that they are all performed according to concrete expectations or rules that the artist will work within to create an end product; for example, a sound mixing engineer will focus their attention to identify imbalances or unwanted noise and devise a step-by-step plan on how to fix these issues based on their experience and knowledge from similar situations. They also know what sonic character each instrument should have under different genres' contexts and will adjust their mixing technique accordingly. These guidelines, expectations and rules can be called a *creative boundary*, or "the box" from the phrase "thinking outside/inside the box".

Creative tasks that are driven by deliberate-cognitive creativity often do not require inspiration or "flow" to be performed and can generally be diligently performed as long as the artist is motivated or instructed to do so. For example, a talented music producer may feel uninspired and experience a creative block but may still be instructed to create something concrete ("make a hip hop drumbeat" for example) and do so with no issues.

Some people may feel that deliberate-cognitive creativity is not "true" creativity, or that the resulting product is not fully their own work, as they are following recipes or working within certain guidelines. However, it is important to note that the recipes or guidelines they are working within is often their own interpretation on how it "should" be done. In other words, even if a music producer was externally instructed to create a hip hop drumbeat, it would be built using their own subjective knowledge and opinions on what a hip hop drumbeat consists of, and therefore still contain the subjectiveness associated with "true" creativity (which may often refer to spontaneous-cognitive or spontaneous-emotional creativity).

2.2.4 Deliberate-emotional

Deliberate-emotional creativity is creative output from deliberate processing of complex emotions. This is normally experienced during psychological therapy sessions, where one would "search themselves" for answers to complex emotional problems (Dietrich, 2004, p. 1019). Deliberate-emotional creativity may occur when deliberately searching for emotional qualities within music, for example trying to find chords, melodies or sounds that convey specific complex emotions like melancholy, serenity, or longing. This would still require processing of cognitive information like music theory, genre knowledge and playing skills though, so it is fair to assume that deliberate-emotional creativity is unlikely to occur on its own in the context of music creation.

3 Historical inspiration/context for the thesis

As the separation of spontaneous and deliberate creativity is based on recent neuropsychological research, there is little prior work in the field of music that aims to explicitly target one or the other. However, it is possible to point to historical research and work that can be retrospectively analysed to encourage specific types of creativity. For example, spontaneous creativity is closely related to "true creativity" like intuition and thinking outside the box, meaning that fields like improvisation and idea generation may fall into that category. Furthermore, deliberate creativity is more related to problem solving and working within specific frameworks, and is perhaps more related to productive, focused work.

3.1 John Cage: Indeterminacy in music

During the late stages of modernism in the first half of the 20th century, composers began experimenting with indeterminacy, chance, and randomness in their music. The peak of this experimentation occurred around the 1950s, most famously by composer John Cage. For example, for his 1951 piano composition "Music of Changes", Cage would "consult" the I Ching² by generating random numbers and receive instructions on how to structure/compose the piece. His compositions would also often include indeterminacy and randomisation during live performance, with the reason for doing this being to free the music from his own and the performer's likes and dislikes (Antonio, 1989).

Cage's implementation of indeterminacy has some interesting potential effects on creativity. On one hand, concrete random instructions such as the choice of tempo, dynamics and pitch may help define a creative boundary that he or the performer may work within, encouraging some deliberate-cognitive creativity. On the other hand, giving away control over the composition and performance may result in unexpected or surprising impressions that cause new, subconscious impulses to emerge as a response. The performer would to some degree have to subjectively interpret Cage's instructions in the scores together with real-time randomisation. This requires real-time lateral thinking, which is primarily associated with spontaneous thought and creativity.

The relationship between indeterminacy in the music creation process and the type of creativity used is perhaps dependent on the time-scale involved: In slower processes such as composing, the introduced randomness will provide new impressions and instructions that the composer has time to consciously process, thereby widening their creative boundary and encouraging deliberate creativity. In faster processes such as live improvisation, the introduced randomness will require much more immediate responses that the deliberate creativity cannot provide, thus encouraging more spontaneous creative output.

² The I Ching is an ancient Chinese divination text. By indexing a random number (originally with sticks of various lengths), the text provides hexagrams that can be further interpreted. The I Ching is also referred to as the "Book of Changes".

3.2 Karlheinz Stockhausen: Intuitive music

In a lecture held in 1972 at the Institute of Contemporary Arts, London, Karlheinz Stockhausen highlighted the oxymoronic nature of genres like free jazz, which is supposed to be performed freely improvised and without inhibition yet is “still jazz”; by simply including the word “jazz” in the genre name, he argued that however abstract the performance may be, it would still somehow be jazz and therefore conform to certain rules/expectations (Stockhausen, 1972).

His creation to combat this was “intuitive music”, a genre in which he purposefully attempted to remove any rules, biases, knowledge, and context from the music, to completely rely on intuition during performance. The idea was that this would let the performers channel their inner, raw creativity, completely unaffected by any convention or logic. For his intuitive music pieces, Stockhausen would create scores using abstract written prompts or graphic elements, so that his own taste and style could not be directly translated to the performance through concrete notation.

Although the terms weren’t coined at the time, I interpret intuitive music to be intended to not only encourage general spontaneous creativity, but specifically spontaneous-emotional creativity: When performing improvised live music, whether free improvisation or not, one would normally mainly rely on spontaneous-cognitive creativity (subconscious, but using trained skills and knowledge), but Stockhausen’s ideas on removing any context and knowledge from the music can be seen as an attempt at removing the “cognitive” part of spontaneous-cognitive creativity, which would leave only spontaneous-emotional creativity left (the most primal creativity). Although this might have been his intent, his performances would often include some form of notation and instructions for the performer to reference his previous compositions - all of which go against his initial descriptions of what intuitive music should be by requiring experience and knowledge. Therefore, I would argue that intuitive music is no more removed from boundaries and influence than other free improvisation genres, but Stockhausen’s perspectives on the creatively confining effects of contextual bias in genres/styles are still valuable inspiration for this thesis.

3.3 Brian Eno and Peter Schmidt: Oblique strategies

In 1975, musician/producer Brian Eno and multimedia artist Peter Schmidt published a deck of cards named “Oblique Strategies”. The deck contains around 100 cards, each of which contain some sort of prompt, suggestion, question, or statement that is meant to break creative block. Some cards are specifically aimed at music production/creation, while others are more general and may be helpful in other creative fields. Here are some examples³:

Be dirty.
Use filters.
Honor thy error as a hidden intention.
Water.
What would your closest friend do?
You are an engineer.
(Eno, 1978)

³ These examples from Oblique Strategies are retrieved from an online transcription of the card deck by Matt Rickard: <https://matt-rickard.com/list-of-all-oblique-strategies>

Although some prompts like “use filters” contain some concrete instructions, most of them are worded in a way that require association and interpretation to relate to one’s own practices. For example, when producing music, the prompt “Water” cannot be followed literally, as it doesn’t contain any direct instructions, or any terms logically relatable to music production. Instead, the user must explore allegorical or metaphorical context surrounding the prompt and try to find connections. Water is a flowing liquid and could be interpreted as a prompt to make an element in the music “flow”, or perhaps the user might include musical elements culturally associated with water related movie scores (such as marimba or lap steel).

“What would your closest friend do?” is an interesting prompt in that it encourages the user to imagine their own work through the (imagined) perception of another person, assuming they know what their closest friend’s likes and dislikes are. As an example, let’s say person A is writing a jazz trio tune and draws this prompt as they are debating how to structure it. They know that their closest friend, person B, is a pop musician that dislikes free form and prefers to follow notation while playing. Person A chooses to “listen” to the imagined version of person B, and creates a strict, predetermined structure to the song.

Although these two prompts seem to have little in common on the surface, they (and the rest of Oblique Strategies) are in reality quite similar: All the prompts will in some way challenge the rational mind of the user by encouraging an abstract relation to something new. This changes their perception/understanding of their own work, in turn causing them to discover new, hidden, and unusual ways to self-reflect. As discussed in section 2.1.3, this is called lateral thinking, and is primarily driven by spontaneous creativity.

Oblique strategies have served as an important inspiration source for the creative augmenters presented in part 4.

3.4 Rigid rules: Sound, style and genre

Going back to Karlheinz Stockhausen’s 1972 lecture, he highlighted the fact that all genres or styles will impose their own sets of expectations, conventions, and rules upon the performer (Stockhausen, 1972). These were seen as a negative influence in the context of his attempts at exploring impervious intuitive creativity in his performances - however, they are not necessarily negative in other contexts. As discussed in section 2.2.3, deliberate-cognitive creativity is used most efficiently when problem solving or working within a set framework (creative boundary). This means that these contextual connotations and expectations imposed by any “sound”⁴, style, or genre will help define a creative boundary and thereby encourage the use of deliberate-cognitive creativity.

Although all genres and styles can be said to impose their own creative boundary, some are stricter and more obvious than others. For example, most of western classical music was composed following concrete rules, determining voice leading, unwanted intervals, composition structure, theme expositions and more. A notable example of this is how Johann Sebastian Bach’s masterfully composed his fugues in the Baroque period, intertwining multiple different melody lines into cohesive pieces (counterpoint) while following strict rules. Bach is likely to have consciously considered the “limitations” he

⁴ “Sound” in this case refers to an artist’s recognizable way of creating music. This can be a repeated usage of specific instruments, sounds, rhythms, mixing styles, melodies etc., that eventually becomes a part of the artist’s image.

was working within, in a way turning composing into creative problem solving. Although he was working inside these strict creative boundaries, his magnificent compositions show that they in no way hindered his creativity. On the contrary, it is likely that the creative boundaries enhanced his creative output through strongly encouraging deliberate-cognitive creativity.

3.5 KOAN sound: Divergent and convergent music production

KOAN Sound is a currently active, UK based electronic music duo known for creating hard hitting dubstep, drum & bass and other electronic genres. Through a subscription service at Patreon⁵, they provide tutorials and guides that give fans a detailed look at their way of creating sounds and music. Through this, I have noticed that they have a particular way of producing music that resembles divergent and convergent thinking: They will use synthesizers, instruments, or noisy sources (for example paper) in a random or sporadic way to generate a decent amount of unpredictable or noisy material ("divergent production"), which they will later cut, edit, and process through deliberate labour to create a more concrete sound or part ("convergent production").

During the divergent part of the process, they may improvise or randomly tweak certain parameters in an unpredictable way, with the intent of surprising themselves with the outcome. The outcome will also often be processed multiple times through complex and unpredictable effect chains. By doing this, they are introducing working material outside of their expectations, forcing them to constantly adapt their techniques to "shape" the unpredictable sounds into something usable. In a way it is similar to brainstorming, using the music technology as an extension of their own spontaneous creativity to generate "ideas" in the form of sounds, that can be further processed and made sense of using more focused, deliberate work.

⁵ Patreon is a website where artists/creators can provide exclusive content such as tutorials, how-to-guides, early access music, material etc. as a monthly subscription service to fans.

4 Result 1 – Creative augmenters

Based on the models of creativity discussed in section 2, analysis of the historical work from section 3, as well as empirical trial and error, I will in this section propose a set of creative augmenters that may encourage either a specific type of creative thought, or a combination of several. Contrary to creative prompts such as those found in Oblique Strategies or other remedies for creative block, the aim with the augmenters is to discover the underlying creative processes that is behind them. They are mainly created within the context of creative music production, although they may be applicable to other creative fields as well.

4.1 Encouraging more spontaneous creativity

4.1.1 Altered states of consciousness

Altered or lessened states of consciousness (such as dreaming, daydreaming, or “trips”⁶) may encourage more spontaneous creativity through the downregulation of the conscious processes of the brain. Without the consciousness’ ability to conform to conventions and logic, the creative output is often more abstract and freeform. This explains why some people experience heightened or more “free” creativity while under the influence of certain narcotic substances, and is also a reason why dreams or “trips” often contain logic-defying and “random” events and imagery (Dietrich, 2004). As many methods of deliberately altering the state of consciousness involve illegal substances, they will not be covered or encouraged here. Daydreaming, mind-wandering, and meditation are more ethical examples of altered states of consciousness that can occur during creative work, that will often provide room for the spontaneous creativity to flourish by downregulating consciousness. There are also other ways to undermine the conscious, deliberate mind without requiring an altered state of consciousness. These will be discussed in the following sections.

4.1.2 Improvisation (real-time processes)

Improvisation is the process of creating something new “on the spot”. This is often done in music performance, where musicians will compose and play pieces or sections (solos) in the moment. In group performances, improvisation also includes responding to the musical gestures of other musicians, by playing response phrases, adjusting strength or tonal colour, highlighting rhythms etc. In theatre/film, improvisation may be used to create unscripted dialogue and stories in real-time, allowing the actors to perform more intuitively.

An important element of improvisation across any creative field is the time scale; the time in which a performer perceives incoming stimuli, processes it, and creates a response output, is usually very short. To exemplify: In theatre/film, a too long thinking pause between lines may break the audience’s immersion, and in music performance, there will often be a tempo/rhythm that necessitates immediate output (if a performer would take too long to ponder over their next phrase, the phrase might not fit with the

⁶ A “trip” is in this case referring to the altered state of consciousness resulting from psychedelic substances such as LSD or psilocybin mushrooms.

piece anymore). As deliberate thought (and creativity) is known to be slow, it cannot keep up with the constant impressions and demand for output that is present during improvisation. Thus, most improvisation is likely to be a result from spontaneous creativity.

Here are some suggestions on how to implement improvisation in music production:

1. Record an instrumental solo for your project.
2. Pick a key and tempo, hit record, and play an instrument for 2 minutes. Repeat and try to complement your previous takes as if they are played by someone else during live performance.
3. Map effect plugin parameters such as filter cutoff, reverb dry/wet, and delay time to physical knobs. Play through parts of the song and record the knob input in real-time.
4. Use a Launchpad or another pad MIDI controller. Map different chord and drum samples to different pads, hit record, and improvise.
5. Create a complex effect chain and map several parameters to physical knobs/faders. Have one or more musicians improvise while recording their sound through your effect chain. Tune parameters while recording to support or challenge their playing.

4.1.3 Abstraction

Another way to undermine deliberate creativity, and therefore encourage spontaneous creativity, is through abstraction. Abstraction is the process of decomposing a complex idea or object into its simpler building blocks, often removing it from its original context. Let's look at an example below (Figures created by me). Figures 1 and 2 are both abstract collections of shapes and colours. At first glance, it is not possible to derive any meaningful context, message, or purpose from the images, without a deliberate effort to search for hidden meaning. However, simply by reorganising the shapes from figure 1 and assigning them the colours from figure 2, we can create figure 3. Figure 3 clearly depicts a scene featuring a house next to a pink flower in a grass field, with a bright yellow sun on a blue sky above. In this example, figures 1 and 2 are both abstractions of figure 3.



Figure 1: Shapes (original image) Figure 2: Colours (original image) Figure 3: A house, flower and sun (original image)

Even though figure 3 is only made up by the same shapes and colours as figures 1 and 2, it contains a plethora of extra information that we subconsciously extract. Instead of referring to the shapes as their basic shape name such as square, rectangle, circle, or triangle, one may instead intuitively call them "window", "door", "sun" or "roof". One

may also refer to clusters of these shapes as “house” or “flower”, without ever deliberately analysing their position or colour. By engaging in more deliberate analysis, it is even possible to make assumptions about the species of flower, material of the house, roof, and door, as well as the season based on the life cycle of the flower and the depicted weather.

It is important to note that figure 3 in itself is an abstraction, perhaps of a real photo of a similar scene. With the increased level of detail that would be available in a real photograph, one would perhaps be able to more accurately (and more intuitively) determine the location of the scene, identify more species of plants, building materials and age of the house, and so on. Contextual information like this may not necessarily be immediately removed from an idea (like the photo) when it is abstracted, instead it requires reasoning based on the more limited amount of information made available, and therefore is gradually removed from intuitive understanding.

To put it bluntly, a photograph, a video, or even experiencing something in person, are all arguably abstractions of true reality. A photograph will capture just a single moment in time and carries limited information about what happened before and after capture, even a video will only be able to depict events happening in a certain direction from the camera, will not render colours and dynamic range in a completely realistic way. Our eyes themselves are only able to see a fraction of the true range of colours that exist in nature, our ears are limited in frequency, and our brain will still remove most of the incoming information as it is deemed not necessary to create an understanding of what is observed/experienced. Abstractions are in this sense explained by the application of some type of perceptual filter on a concept, only letting through a certain amount or complexity of information.

When it comes to creative music production, I believe abstraction to be a powerful tool for avoiding habitual output. Similarly to how one can abstract the previously discussed graphical depictions of a house and a flower by breaking it into its shapes and colours, it is possible to break a range of creative processes in music production into components that are less familiar, and therefore requires a more exploratory and reaction-based approach instead of blindly following habit. Let’s now look closer at specific ways do this:

4.1.3.1 Abstraction of control

Abstraction of control occurs when there is an unfamiliar way of interfacing with a tool. Basic examples of this could be instrument constraints like removing the sustain pedal on a piano, taping down certain keys on a flute, or tuning a guitar to an unfamiliar tuning, or obscure ways of interacting with synth engines like breath control, light sensors etc. Let’s look at the example of tuning a guitar to an unfamiliar tuning, such as DGCGAB. This deconstructs complex, learned ideas such as chord names, what chords are likely to be in a sequence, licks (“go-to” sequence of notes, often rehearsed to the point of automaticity) or genre specific voicings (ways of constructing a given chords, such as the famous “hendrix chord”, 7#9), into instead having to think about each individual string and where one could place the fingers to achieve harmony. The player is forced to learn new finger positions and to build chords using new voicings, since the new tuning might not physically allow conventional chords (if strings are tuned too close or too far apart in pitch).

Another, more literal way of abstracting control could be to create custom mapping schemes/macros when controlling digital parameters in music production/performance. In most DAWs, almost any parameter on any plugin (add-on software like synthesisers

and effects) can be bound to some type of augments (like automation, LFOs or other controllers). In FL Studio (my preferred DAW), any parameter can also be bound to user made macro controllers (knobs/faders that are used to control multiple parameters at once), with the possibility to create a custom mapping curve for each parameter. For example, it is possible to create a single knob (that can also be controlled by external hardware or automated) that fades in a distortion effect when going from 0-50%, then a delay effect from 50-100%, with the delay time decreasing between 50-75% and then increasing again between 75-100%.

A lot of sound plugins are premade with macro controls such as this. My personal first encounter with this was in Native Instruments Massive, a software wavetable synthesiser released in 2006. Although the synthesiser offers the user control over every single parameter (of which there are a lot), every preset sound in the synthesiser comes pre-programmed with up to eight macro controllers that each control several of the synthesiser's parameters. It even has a dedicated "attributes" tab, where only the macros as well as a preset organising window is shown, allowing users to play and explore the synthesiser without ever having to manually tweak or even look at the in-depth parameters. Given that each macro controller can be connected to an unlimited (as far as I'm aware) number of internal parameters, they will often have drastic effect on the final sound, allowing a plethora of variations from very little tweaking. Many simple and beginner friendly plugins feature pre-made macro controls.

In my experience, it is very subjective and genre dependent how much one can abstract the control over a tool before it becomes too unpredictable and hard to control, and therefore hinders creativity more than it encourages it. Imagine for example that you are playing concert: Your instrument is a single button that has been mapped so that it will trigger a random sample that the instrument recorded automatically during the performance, played either normally or reversed, with a random selection of effects applied. In free group improvisation this might work perfectly, providing a level of unpredictability that you and the other performers may react to. In another scenario, you might be performing rock music, and end up not pressing the button at all in fear that its output will be "wrong" for the genre.

This example highlights how abstraction's efficiency is related to musical context as well as the person's expectations and open-mindedness. If they are experimental in nature, they might accept and be inspired by a high degree of abstraction, and conversely, they may only tolerate a low degree of abstraction if they feel bound by rigid rules of genres or their own criticism.

The degree of abstraction likely also correlates to what type of creativity is being engaged. As the interaction becomes increasingly abstract, the ability to logically and deliberately understand it fades, and prior experience and knowledge becomes less and less useful for processing it. This means that concrete interaction, such as programming a synthesiser, will rely more on deliberate-cognitive creativity, as it is both a logical and knowledge-based action. Furthermore, slightly abstract interaction such as using macro controllers will rely more on spontaneous-cognitive creativity, as the rational and deliberate part struggles to make sense of it. Lastly, extremely abstract interaction such as avant-garde live-processing setups will possibly begin to engage spontaneous-emotional creative responses, if it becomes so abstract that any attempt at learning or understanding it is unsuccessful. Here are some suggestions on how to implement abstraction of control to music production:

1. Tune a guitar to EADABB and learn to play it.
2. Create a macro controller that affects the intensity of 5 different instruments/effects, create a loop and improvise over it.
3. Use an RMS tool to map incoming audio level to the delay time on a delay plugin.
4. Use any cross-processing tool (cross-synthesis, vocoders etc.) to process a live sound against a time delayed version of itself. Play.
5. Control a live performance patch using distance, motion, and pressure sensors.

4.1.3.2 Abstraction of prompt

Abstraction of prompt is referring to the process of removing contextual information from an idea or prompt. This augments is largely inspired by Brian Eno and Peter Schmidt's "Oblique Strategies" (discussed in section 3.3), a deck of cards that contains prompts, instructions, and questions of varying degrees of abstraction. To better understand abstraction of prompt as a creative augment, let's start by comparing two song making prompts (created by me):

1. Make a country song about a horse in E minor.
2. Make music that levitates, blue-green colour.

Even though both prompts are of similar length, prompt 1 is much more concrete and specific in its instructions, and therefore limits several potential artistic decisions (theme, style, key). The term "country song" also contains a plethora of contextual implications about what instruments, tempos, chords, melodies etc. are expected to be used.

Contrarily, prompt 2 gives vague, abstract, and subjective instructions. Both "levitating" and "blue-green" music are nonsensical descriptions, as music of course is without physical properties and therefore cannot levitate or have any visible colour (disregarding potential *synaesthesia*⁷). Instead, the reader is forced to think metaphorically and try to imagine abstract similarities and thereby give new meaning and context to the descriptions. In other words, the reader is forced to try to connect the dots between unrelated concepts/ideas, or "think outside the box" (divergent/lateral thinking, discussed in section 2.1.3). Because this process includes a conscious "search" for meaning/connections, there is undeniably some deliberate processing also happening. However, similarly to a brainstorming session, I argue that the deliberate process is mostly used to pay attention to and evaluate the thoughts emerging from the spontaneous process.

The effectiveness of an abstract prompt is likely related to the subject's general ability to think metaphorically, as well as their prior knowledge and experience that they may relate it to. For example, a person with little knowledge of music composition/theory will probably have difficulties connecting abstract descriptions such as "levitating" to specific musical gestures, as those gestures might not be present in their knowledge. Based on this, it is logical to suggest that abstraction of prompt targets mostly spontaneous-cognitive creativity through engaging in lateral thinking.

⁷ The condition *synaesthesia* causes certain sensory stimuli to be experienced as a second stimuli of a different sense. In certain people, this can manifest as being able to see music as certain colours or shapes.

Here are some abstract prompt suggestions to use as examples:

1. Repeat slightly to the left.
2. Invert the shape.
3. Look for clues.
4. Make a contract and honour it.
5. Add 50%.

4.1.3.3 Abstraction of sound

Abstraction of sound is referring to the process of deconstructing a sound into something unrecognisable. This could be done through sampling techniques such as time stretching and pitch shifting, granular synthesis, additive resynthesis, signal processing and more. This is perhaps perceived more as a production technique rather than a creativity encouraging technique, but I argue that the unpredictable results from processes such as these may sometimes provide new impressions that may alter or change how a person experiences their own work, and thereby encourage new ideas.

Abstraction of sound is similar to abstraction of prompt in that it gives the user a new and unexpected perspective on their own work and engages lateral thinking, but I have separated them as I believe there is a qualitative difference in the lateral thinking resulting from an abstract prompt to that of an abstract sound. While an abstract prompt may encourage a deliberate attempt at interpretation, abstract sound will, in my experience, often evoke an immediate reaction without requiring any deliberate analysis. This might be related to the fact that language requires a higher degree of focus and cogitation than listening to abstract sound does. Nevertheless, exposure to abstract sounds can prompt spontaneous responses both in the cognitive domain (associations or ideas) and emotional domain (evoked emotions or moods).

Here are some examples of how to encourage creativity by abstraction of sound:

1. Reverse audio.
2. Run sound through a frequency shifter.
3. Put a sample through a granular synthesizer.
4. Time-stretch a short sample to be 100 times as long.
5. Tell a friend to manipulate a loop you made. Continue working on the result.

4.1.4 Real-time delegation of control

Delegation of control means assign the control over a process to something (or someone) else than oneself. This is quite similar to abstraction of control, but there is an important difference: When abstracting control, the artist is still the one in control of every parameter (abstraction *modifies* control), whereas delegating control inhibits the artist from interacting with something at all (delegation *removes* control).

A simple way to delegate control is by mapping randomness to control certain parameters in digital audio software. It is often used sparingly in synthesizers to create slight variations of the sound each time a key is pressed but can also be used to create more profound changes in sound by affecting bigger ranges/more parameters. Sudden or unexpected changes in the sound will require the performer to adjust intuitively.

Cooperation is a different, but important way to delegate control. For example, when improvising music in a group, each performer's control over the total sound, feel, rhythms and structure is delegated to other performers as well as the group as a whole.

This means that each performer will experience real-time impressions that are outside of their own creative scope and control, and either create responses or modify their playing in the moment.

For delegation of control to be as effective as possible at encouraging spontaneous creativity, it should happen in as short of a time scale as possible. This is because the user will be able to analyse the incoming information and form rational responses by deliberate thought, if given enough time (discussed in relation to John Cage's use of indeterminacy in section 3.1). If delegating control during slower creative processes, such as writing or composing music (for example by throwing dice to influence compositional decisions), the user may be required to deliberately suppress rational, habitual ideas coming from the deliberate creativity to effectively utilize the spontaneous creativity.

Here are some suggested ways of delegating control in music production:

1. Assign digital effect parameters (such as delay time, mix or drive) to a random source.
2. Randomize a rhythm pattern in your song.
3. Improvise with a friend, record it.
4. Select a random synthesizer preset and record yourself playing with it for 2 minutes. Select a new random preset and repeat. Save the results for later use.
5. Play a solo electric guitar piece but have someone else control your guitar pedals while you play.

4.2 Encouraging more deliberate creativity

4.2.1 Concretization

Concretization refers to the process of making something abstract more concrete or tangible. This involves transforming ideas or concepts into something specific, clear, and understandable, often through detailed examples, illustrations, or practical implementations. The purpose of concretization is to capture abstract ideas or concepts in a more understandable and tangible form.

At its core, concretization is about manifestation. For example, it can be observed in visual arts in the way a painter uses simple colours and strokes to capture the mood of a landscape or the essence of a moment. Seeing a real sunset, for instance, may be felt as a blend of tranquillity and awe, which are complex and abstract emotions. The painter's task is to concretize this feeling, to assemble colours and textures that evoke these same emotions in the viewer, making the abstract experience tangible through the canvas.

In literature, writers concretize abstract thoughts and feelings through characters, dialogues, and stories. A writer might begin with the abstract concept of "love" or "betrayal" and then create a story that explores these feelings by constructing specific events and interactions. The abstract feelings are given concrete form through the plot, allowing readers to experience and understand their complexity in a structured, tangible manner. Concretization is in this setting not referring to directly state how a character feels in a given moment, but rather capture the feeling "between the lines", letting the reader experience it by context.

Similarly, concretization in music is about capturing contextual information and emotions as clearly as possible, without necessarily having the lead vocalist explicitly state how the

listener should feel. Every little element in the music such as chord voicings, progressions, sound mixing, instrument choice etc., may contribute to invoking abstract emotions or tell stories without it being explicitly stated.

4.2.1.1 Concretization of prompt

In the same way concretization can be used as an artistic tool to capture emotions with art, it can also be used in creativity to attach contextual information to creative processes, for example via prompts. Imagine for example two scenarios where you are asked to create a score for a short film:

Scenario 1: The producers are doing an experiment where they only give directions to actors and artists in the form of playing cards. You are given the cards "3 of hearts", "4 of spades" and "queen of spades" as your directions for the score.

Scenario 2: The producers are making an old western style short film about turmoil in a desert town, and expect a score that fits with the theme.

In scenario 1, you are given directions that bear no logical connection to any style of music, meaning the prompt does not contain any immediately relevant contextual information and is therefore abstract. As discussed in section 4.1.1.2, this is not inherently a bad thing as it can lead to new and different creative ideas, however it may be difficult to get started or lead to unpredictable results. Moving to scenario 2, you are given a more concrete prompt of making music that fits an "old western" movie style. Even though the term "old western" does not explicitly give you a step-by-step guide on how you should compose and produce the score, it does contain connotations that you will be aware of. This could be instrumental choice (many "western" tracks contain whistling, marching drums, solo trumpets, electric guitars etc.), melody/harmony (inspiration from folk, country, Latin genres etc.), recording techniques and more. These connotations turn into expectations or rules that define your choices as you compose/produce, in other words defining a mental "box" of known variables for you to work within. As discussed in section 2.1.2, the deliberate creativity excels at working within such a creative boundary, leading to a much more focused and efficient solving of the task (compared to when relying on spontaneous creativity).

Here are some examples of concrete prompts that are relevant for music production:

1. Produce a dubstep track.
2. Create the theme song for a children's show about race cars.
3. Make a fusion between jazz and house.
4. Write a sea shanty about an adventure.
5. Create a song/track that is impossible to perform.

4.2.1.2 Concretization of material

Another way of concretizing music production is the concretization of material, which is done by limiting or specifying the material or tools the producer is allowed to work with. Similarly to how a concrete prompt will carry contextual "rules" that limit the producer's creative scope, working with concrete material will bring its own limitations and rules that define creative boundaries. There are two main ways to concretize the working material; By limitation or mandatory inclusion.

Limitation, in this context, refers to restricting what material or tools are available. For example, a composer may write a string quartet piece, where they will be limited to a maximum of four instruments playing simultaneously (normally two violins, one viola and one cello). This creative augments is found in many creative fields; composers are

limited by the number of instruments in the performing ensemble, guitarists are limited to 6 simultaneous notes (normally), flute players by their breath, studio technicians by their number of mixer tracks/lines etc. However, these limitations rarely hinder the creative output. In fact, their effect of narrowing the artist's creative scope often results in both productive output and a greater familiarity with their craft (when there are fewer total variables, it is easier to learn all possible combinations). Here are some suggestions on how to add limitation to music production:

1. Use a maximum of 10 different sound sources.
2. Every sound must be recorded with a microphone.
3. Only use stock plugins⁸.
4. Record directly to tape.
5. Only play in C major.

Mandatory inclusion is a form of concretization similar to limitation, but more specifically referring to situations where the artist is working with requisite/mandatory material or tools. In music production, this is most commonly encountered in remix⁹ competitions, where producers are given audio stems from an original song that they must somehow include in their remix. This is often the only rule, and the producers are given complete creative freedom otherwise. Mandatory inclusion can also be experienced in certain music genres: A disco song would not be labelled as disco without a "four-on-the-floor" drumbeat, and a reggae song would not be labelled as reggae without its characteristic offbeat rhythm. What separates mandatory inclusion from limitation is that it doesn't directly define the creative boundaries the artist works within. Instead, it will introduce an element that the artist may construct their own creative boundary (or workspace) around, and therefore gives more creative freedom. Here are some prompt suggestions on how to implement mandatory inclusion when producing any music genre:

1. Include a predetermined sample/loop, somehow.
2. Use an acoustic guitar.
3. Song must contain a 5/8 beat.
4. Record and use an outdoor sound.
5. All percussion must be made from foley.

4.2.2 Instruction and learning

Learning new techniques or skills through following instructions/guides can be a great way to encourage deliberate creativity. Storing new information will in general support cognitive-based creativity (both spontaneous and deliberate), as more knowledge leads to more possible connections. However, learning new knowledge may sometimes lead to a deliberate reflection, where the individual will consider how the new information may relate to their prior knowledge. For example, I personally remember coming home from guitar or piano lessons when younger, feeling inspired to create my own music using new theory or techniques I had learned. I would then deliberately and methodically explore how to insert the new knowledge into my playing and composing.

⁸ "Stock plugin" refers to any plugin software that is built into its host DAW. These are often considered simpler and less refined than their 3rd party alternatives.

⁹ A remix is a song or track that contains recognizable elements (often vocals) from another song. It most often has the same name as the original, with the remixer's artist name after, for example "Bed of Strings (Johannes Rønning remix)".

In music production, a common way of accumulating skills and knowledge is by watching how-to and step-by-step guides on YouTube. Many electronic music producers may for example watch video guides on how to replicate a big artist's signature sound design, how to create a specific synth growl¹⁰, mixing guides and more. The producers will then be able to experiment using the newfound knowledge, which can help broadening their creative boundaries. As it is difficult to create specific prompts or suggestions on how a music producer might pursue creativity from learning, I have instead created a short list of music production skills/topics that I have personally experienced creative inspiration by learning about (your mileage may vary):

1. Neuro reese bass sound design.
2. Image resynthesis.
3. FM synthesis bass design.
4. Learning an audio related coding language (such as Csound or Max MSP).
5. Exploring the artifacts produced by different time stretching algorithms.

4.2.3 Mimicking

Mimicking is the process of replicating something you did not make yourself, for example by attempting to create a song in a similar style to that of a popular artist. It is perhaps most associated with learning scenarios, where students may attempt to copy the style of a certain artist. Painters will do "master studies" where they copy the works of renowned painters to learn their techniques, colour use and composition, and jazz music students will learn solos by ear to learn the artist's phrasing, melodic language, and expressions.

Although mimicking is quite similar to following concrete instructions (discussed in the previous segment), it does require the user to already have some familiarity with the material they are trying to recreate. For example, while most people might be able to follow a step-by-step guide on how to recreate a specific synthesiser sound, only people with existing skill may be able to listen to a sound and then recreate it using the tools they already use and know. This means that the user will be more encouraged to piece together their prior knowledge in a way that can resemble what they are mimicking, instead of necessarily relying on *new* knowledge. This provides the user with a new perspective on their own prior knowledge, which will help broaden their creative boundaries.

The fundamental goal of mimicking is to use existing knowledge to recreate a predetermined outcome. It is therefore possible to incite mimicking in situations where the user might already know how to achieve the predetermined outcome, by limiting the existing knowledge. To explain, imagine you are tasked with recreating a complex synthesizer sound from a song you made yourself previously. As you know exactly how it was originally made, no problem solving, or creative exploration is needed for you to recreate it. However, if you are also given a limitation that you cannot recreate it using the same synthesizer as you did previously, you are forced to explore how alternative synthesizers can be tweaked to produce a similar result.

¹⁰ "Synth growl" is referring to a genre of bass sounds that often sound like a shouting or growling creature, used in heavy EDM genres such as dubstep and neuro.

Here are some suggestions on how to encourage creativity through mimicking:

1. Pick a song to recreate in an 80s disco style.
2. Create a drum loop using only traffic noise as source sounds.
3. Make a song in a genre you have never made before.
4. Synthesize bird song.
5. Recreate the roar of Godzilla using your DAW.

5 Result 2 – “one_eighty”

The album “one_eighty” is a selection of songs/tracks that I created as experiments for this thesis, from fall 2021 to summer 2024. Each of the 6 total songs/tracks were made while exploring different ways of implementing the creative augmenters from section 4. In some cases, the creative augmenters were the catalyst that started the song creation process, in other cases they were used as tools to help continue working on songs that had come to a standstill. I will go into further detail on a song-by-song basis.

one_eighty was composed, performed, recorded, produced, and mixed by me (unless otherwise stated) in my home studio, mainly using whatever instruments and tools I had access to there. I was however fortunate to have collaborators on some songs, which led to some very interesting and surprising creative interactions.

It is important to repeat that the proposed creative augmenters from section 4 were created simultaneously with this album, in a “circular” form for experimentation and analysis. In other words, both the creative augmenters and the album influenced each other throughout the research and experimentation phase of the thesis, and ultimately culminated in their current forms.

I created graphical representations of the song structure for each song/track, to make it easier for the reader to identify certain elements or parts. These are inserted as figures under each song/track’s section, and are also attached as separate jpg files in higher resolution.

Here is an overview of the tools used to make one_eighty:

Hardware:

Korg Prologue	- analogue synthesiser
Korg Minilogue	- analogue synthesiser
Korg SV2-S88	- stage piano
NI Komplete Kontrol S88	- MIDI keyboard/controller
Chapman ML1	- electric guitar
Flambeau (unknown model)	- acoustic guitar
Micparts S87	- condenser microphone
Shure SM7B	- dynamic microphone
Presonus Quantum	- audio interface
Bowers & Wilkins 805 D3	- reference monitors
Apple Macbook Pro mid 2015	- computer
Fisher CR-W67	- cassette player/recorder

Software:

Image-Line FL Studio 21	- digital audio workstation
Splice	- sample library/search engine

Software add-ons/plugins (most used):

Gammel (home-made)	- tape wow/flutter, tube saturation, filtering
Arturia Tape Mello-Fi	- tape wow/flutter, tape saturation, noise
Soundtoys Devil-Loc Deluxe	- saturation/compression
Soundtoys Decapitator	- saturation
Soundtoys Little Alter-Boy	- pitch/formant shift, auto-tune and saturation
Soundtoys Crystallizer	- granular/pitch shifting delay
iZotope RX mouth de-click	- removing mouth clicks from vocal takes
iZotope Neutron	- AI-powered mixing tools
iZotope Ozone	- AI-powered mastering tools
Native Instruments The Grandeur	- sampled, playable grand piano
Native Instruments Studio Drummer	- sampled, playable acoustic drum kits
Native Instruments Battery	- drum sampler
Native Instruments Vintage Keys	- sampled, playable vintage keyboards
Native Instruments Raum	- modulated reverb
Native Instruments Reflektor	- IR reverb
Native Instruments RC48	- reverb emulating hardware
Native Instruments Supercharger	- Saturation/compression
Xfer OTT	- multiband compression
Image-Line Maximus	- multiband compression
Image-Line PEQ2	- parametric EQ
Image-Line Pitcher	- auto-tune
Image-Line Limiter	- limiter/side-chain compression
Image-Line Sampler	- single audio file sampler
Image-Line 3xOSC	- simple, subtractive synthesiser
Klanghelm SDRR2Tube	- tube saturation

5.1 If you ever wanted to come back

Runtime: 2:27

Genre: Electronic Pop, influences from hiphop, club, latin beats

Credits: Johannes Rønning (composition, production, piano), Caroline Kristiansen (text, vocals, vocal recording)

5.1.1 Track overview

SONG STRUCTURE - IF YOU EVER WANTED TO COME BACK

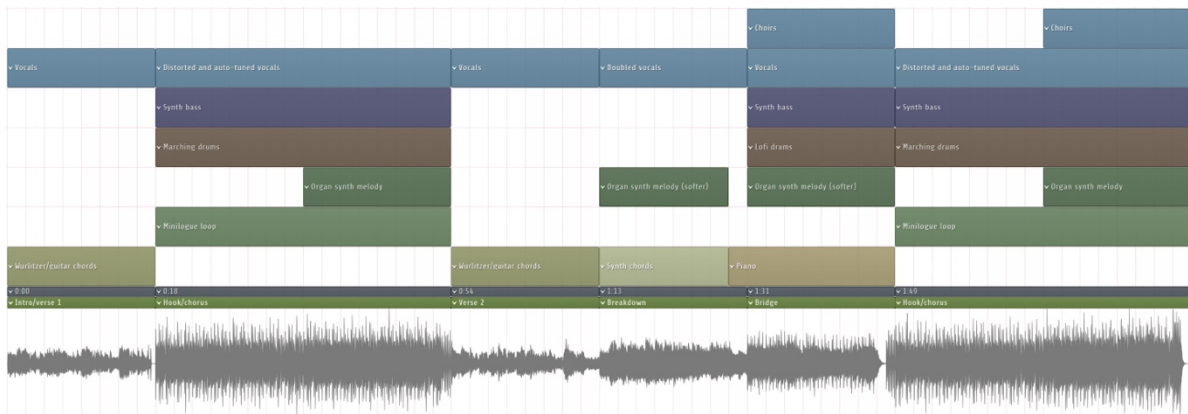


Figure 4: Song structure of "If you ever wanted to come back" (original image)

5.1.2 Creation process

The source idea for this whole song was such a loop that I created on the Korg Minilogue analogue synthesiser. I created an arpeggio pattern using a MIDI clip in FL studio outlining a basic chord progression, and then sent that MIDI through USB to the Minilogue. The Minilogue has a built-in sequencer, but it is limited in length, and I wanted to experiment with longer durations to allow for longer chord progressions. I played the sequence on a loop and recorded the audio output of the Minilogue while tweaking its parameters in real time. Among these parameters were filter cutoff, pitch bend, and oscillator 2 (slightly out of tune compared to oscillator 1) volume. On specifically the pitch bend, I tried to randomly flick it up or down, resulting in abrupt changes in pitch that reminded me of the way the pitch stutters on a tape loop when touching the tape. This was something I experimented with after hearing something similar sounding from the track "Why?" by Mid-Air Thief¹¹. After recording, I could not find an inspiring way to build on the idea, so I exported it as a sound file to put in my loops/idea folder and stopped working on the project.

Later, I experimented with digitally recreating the sound of older electronic organs like Farfisas. I used the very simple synthesiser 3xOSC by Image-Line, mixed together three triangle waves of different volume and pitch to emulate a simple drawbar system, and added a slight vibrato to their pitch for some movement. When playing around with room feel using the NI RC48 reverb plugin, I stumbled upon a fun effect: When using RC48's early reflection simulations together with a short decay time, the vibrato of the synth ends up sounding close to the chorus effect achieved in cheaper electric organs by rotating a waveguide above the bass speaker (similar to a Leslie speaker, but much simpler in sound and design).

¹¹ "Why?" by Mid-Air Thief: <https://tidal.com/browse/track/188575531?u>

Again, I was struggling to find a way to build a song from this sound alone, so I decided to create a challenge for myself. Looking through my idea folder, I found the Minilogue loop and figured its erratic and busy nature could make an interesting contrast to the static-ness of the organ synth. "Make a song that must include both the Minilogue loop and the organ synth" sounded a bit too simple/boring to me, so to make it more interesting I added "keep it in the box", meaning that I should do all the work using software on the computer (no external instruments). The idea behind this was to force a change of habit (I usually record most of my sound from external sources), as well as encourage a more electronic feel in the production.

Based on this challenge, I imported the Minilogue loop into the organ synth project and started building a more complete idea. I created a counter melody using the organ synth and found some percussion loops on Splice to get a quick feel for the rhythm. In this period, I was inspired by 808 drum sounds (originally from the Roland TR-808 drum machine), so I experimented with using an 808 kick on every 4th note and tuning it to the chord progression. I did not enjoy the "flat 4/4" feel this resulted in, so I experimented with creating a "marching drum" style pattern in the kick. Complimented with a marching snare drum pattern from Splice, I was much happier with the energy it gave off. I had created a peculiar and interesting sounding idea, but I found that it was so peculiar that I did not know what more to do with it, or how to extend the song. After some trial and error, I saved the project with the intent to pick it up again at a later date. I will call it the "Minilogue beat" at this stage.

As the beginning of a collaboration with vocalist Caroline Kristiansen, I compiled a folder of different loops, beats and song outlines from my "idea bank", one of which was the Minilogue beat, and sent to her. I had initially disregarded it when looking for material to send, as I did not imagine vocals would fit it, but chose to include it on a whim that she might see something in it that I did not.

Caroline sent the idea back with added vocals, as a showcase of the direction she could see the song going. This first take is the exact vocals that are used in both B parts in the final song. The rhythmic nature of her singing made me hear the song in a completely new way, and immediately gave me inspiration to further work on it. I copied and cut up the vocal track and used it to create the basis for a verse part, together with a keys/synth chord loop from Splice. The extended version was sent back to Caroline, who returned new takes interpreting the structure I created by reorganising her original takes, which again gave me new material to further build the song. This "ping pong" style of working made it easy to quickly build the song, and within just two days the complete song structure was complete.

After finishing the outline of the song, all that was left to do was do the final mixing, add transitions and other "decorative" elements to keep the songs energy levels high. At this stage, I started to feel quite limited by my prompt to "keep it in the box", as I felt inspired to add keyboard, piano and guitar sounds to various parts, to give the song some organic variation. I figured that no rule should stand in the way of creative flow, so I recorded the Rhodes keyboard and guitar parts audible in both verses, some piano for the breakdown and bridge, as well some whistling to double the organ synth melody in the hook/chorus. At this point I considered the song done.

5.1.3 Effects of creative augmenters

The creation of "If you ever wanted to come back" was largely initiated by deliberate creative work. Although the Minilogue loop was created by improvising the tweaking of parameters on the Minilogue in real time, and therefore was largely affected by intuition (spontaneous creativity), it was mainly the prompt "Make a song that must include both the Minilogue loop and the organ synth, keep it in the box" that facilitated the real start of the song.

1. **Concretization of material – restriction:**

The restriction to only use software on the laptop focused my creative thoughts into a set boundary, which was shrunk even more by the mandatory inclusions of the Minilogue loop and organ synth. By drastically limiting the number of directions the song could be pushed, and thereby limiting the number of problems/choices I had to face, I was able to work very efficiently and diligently to "solve" the prompt.

2. **Delegation of control – cooperation:**

There was a standstill during the song's creation, where I could not see a way to continue building the song. It felt like the creative boundary I created was fully explored, and I could not find a way to expand it. This was mended by getting a creative input from Caroline through her vocal additions. By letting her put her own spin on my material, I was effectively delegating control over the song writing process, resulting in an abstraction of my own work: She took the complex idea that was my song idea and extracted simple features such as rhythm and tonality, to create her own artistic interpretation of it. Through this abstraction, Caroline was able to alter the context and connotations of the song, thereby removing my subconscious biases and prejudices about it. This led to several spontaneous impulses/ideas about how to proceed, which was then able to be processed and brought to life by deliberate work.

5.2 Bed of Strings (remix)

Runtime: 3:28

Genre: Indie, electronic, experimental

Credits: Caroline Kristiansen (vocals, composition, and vocal recording, Farin), Niklas Mæle Gjeisklid (guitar and composition, Farin), Henrik Bakka (bass, Farin), Torbjørn Kamfjord Eriksen (drums, Farin), Magnus Holm (keyboards, Farin), Jaran Gustavson (Studio technician, sound recording), Johannes Rønning (synth, mix/production of original, production of remix)

5.2.1 Track overview

SONG STRUCTURE - BED OF STRINGS (REMIX)

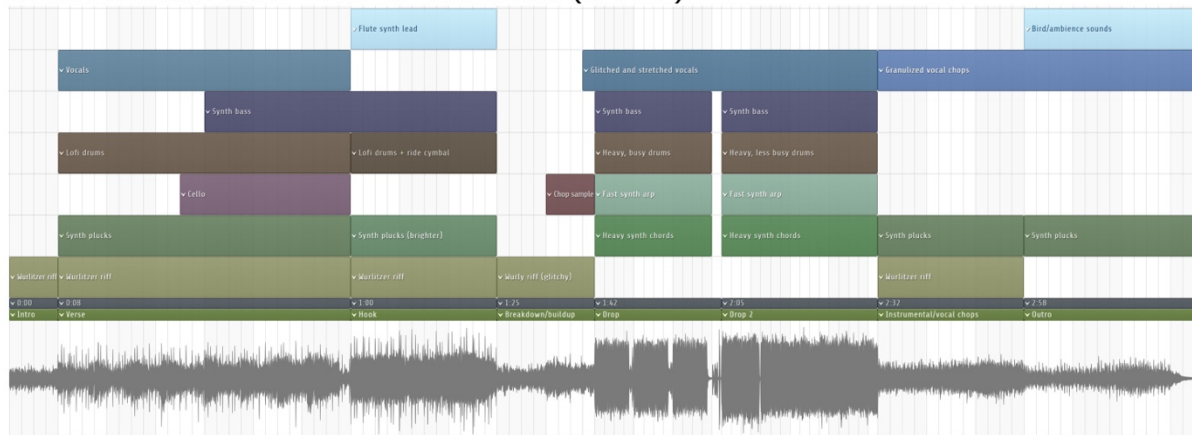


Figure 5: Song structure of "Bed of Strings (remix)" (original image)

5.2.2 Creation process

"Bed of Strings" is originally a song by the band Farin¹². I was hired as the producer/mixing engineer for the album it is a part of, and as such had access to the raw recordings. This song was one of my favourites of the album, featuring beautiful, vulnerable vocals over a breathing and warm track. The band expressed interest in featuring remixes on a separate EP, which prompted me to attempt this remix. Out of respect for the original, I wanted the remix to be something *completely* different, and a new listening experience in as many ways as possible (I didn't want to "soil" the sincerity and beauty of the original). Based on this, I came up with this prompt:

Make a remix of Bed of Strings. Must be other key, tempo and time signature than original.

I wanted to include parts the vocal track from the original, which posed a challenge when trying to compose in another key, tempo, and time signature than the original. There were several options on how to proceed:

1. Tune/pitch/time-stretch the vocals to another tempo and/or key.
2. Mangle/abstract the vocal audio enough to where its key and tempo is unrecognizable (through chopping/granulizing/resynthesis etc.).
3. Keep vocals in original key and tempo and find other tempos and keys that can work with it.

I started off with option 3, as I found it the most artistically challenging (and make the vocals feel more realistic in the new context compared to options 1 and 2). While looping

¹² "Bed of Strings" by Farin (original): <https://tidal.com/browse/track/358278650?u>

the vocals from the first verse of the original, I improvised chords and rhythms on my keyboard, exploring, modifying, and analysing each repetition. Through this process, I created the melodic/rhythmic pattern played by a Wurlitzer and a synthesizer from 0:00 to 1:42 in the song. The original song is recorded in B minor, changing between 3/4 and 6/4 beats at around 100bpm, whereas the Wurlitzer pattern is played in a mix between D major, E minor and F# minor, in a 5/4 beat in 140bpm (with a period feel of 3 bars). The only editing that was necessary to make the vocals fit with it was to shorten the pauses between phrases (and shorten some sustained notes), due to the increased tempo.

With the tonal and rhythmic foundation set, I could start to build a more complete beat. I think only including the vocals from the original song is "lazy" when doing a remix, so I wanted to use parts of the original drum track to build the new rhythm section. This was done by time-stretching the drum track so that its 16th notes aligned with the 16th notes on the 140bpm grid, and then cutting and moving hits around to create a new pattern in 5/4. Its sound was also changed through transient shapers and distortion, to get a tighter/snappier feel.

At 1:25 in the song, I had created a quite linear progression that I felt built towards something. I attempted to include later parts of the vocal track to create a natural progression onwards, but these would not fit in the new tempo and time signature without more extensive chopping/stretching. This led to a creative standstill, where I could not figure out a good way to proceed without just repeating the previous parts. For inspiration, I consulted a website that provides random cards from Brian Eno and Peter Schmidt's *Oblique Strategies*¹³, giving me this prompt:

Emphasize the flaws (Eno, 1978)

This immediately reminded me of audio artifacts I had encountered while stretching the drums to fit the new tempo, which further gave me the idea to attempt to purposefully recreate other digital artifacts to "destroy" the song I had built, and then continue the song with a new aesthetic.

The first way I implemented purposeful flaws was by pitching the Wurlitzer pattern up one octave, using an algorithm meant for pitching monophonic vocals. The algorithm synthesises the output by analysing the pitch of the input, and since the Wurlitzer pattern is polyphonic, it struggles to determine the pitch, and therefore outputs a very "broken" and "glitchy" version of the pattern (heard from 1:25 to 1:42). I also found and experimented with a new plugin, Codec by Lese Audio¹⁴, that emulates the audio degradation caused by low bandwidth and packet loss in online voice chat/video meetings.

The broken and fragmented aesthetic that was emerging reminded me of the album "Worlds" by Porter Robinson¹⁵, which I have drawn inspiration from in the past. I chose to lean into this new direction by making a heavy hitting electronic drop, featuring a mangled, robotic version of the vocals, a busy kick pattern and an intense, dry synth chord stack. As both a play on "breaking" the conventions of the track, as well as fitting better with the electronic aesthetic, I made this part in 4/4 instead of the established 5/4.

¹³ Random Oblique Strategies prompts: <http://obliquestrategies.ca>.

¹⁴ Codec by Lese Audio: <https://lese.io/plugin/codec/>

¹⁵ "Worlds" by Porter Robinson: <https://tidal.com/browse/album/32571279?u>

During the final part of the drop as well as the outro part, the vocals are used in a granular synthesizer to create a fast arpeggio pattern. This was inspired by one of my initial ideas on how to process the original vocals: "Mangle/abstract the vocal audio enough to where its key and tempo is unrecognizable (through chopping/granulizing/resynthesis etc.)". What point in the vocal sample the granules are played from is completely randomized at first, and then more meticulously tweaked in the outro (as I wanted a more coherent phrasing/melody).

5.2.3 Effects of creative augmenters

Although several creative augmenters were used at different points when making the remix of Bed of Strings, I would like to specifically highlight two cases that were of major importance:

1. Mandatory inclusion and concretization – track conception:

As this song is a remix, an obvious creative augmenter that has been important throughout the track is mandatory inclusion: For the song to be a remix, recognizable material from the original must be featured. When including this material, my choice in chords, rhythms and tempos were limited, providing creative boundary for how I could work. This boundary was further constrained by a concrete prompt stating that I had to make the remix in another key, tempo, and time signature than the original.

The mandatory inclusion and concrete prompt created a production challenge that required me to analyse, calculate and test multiple ways to create a satisfying result within the set boundaries. As the entire process was rational, determined, and knowledge-based, it is safe to say it utilized almost exclusively deliberate-cognitive creativity. As the creative boundaries were extremely strict in this case, I worked quite effectively in the beginning, but then came to a complete stop when I no longer knew of a concrete way to progress. At that point, it felt like the boundary was completely explored, and that I needed some form of push to get out of it.

2. Derailing through abstraction – overcoming creative block:

When faced with creative block, I chose to seek inspiration through an abstract prompt from Oblique Strategies: "Emphasize the flaws". As previously explained, this led to immediate associations to previous experiences, which resulted in multiple intuitive ideas surfacing. As this happened without noteworthy deliberate analysis, the ideas were clearly sourced from spontaneous creativity (specifically spontaneous-cognitive creativity, as the subconscious was relating the prompt with prior experience and knowledge). The result from this process was a complete "derailing" of the songs trajectory, effectively removing the existing creative boundaries and allowing new ones to form.

I believe a big part of the success of the creative abstraction in this case is my willingness to follow the prompt from Oblique Strategies. It may be easy to dismiss such a prompt if it is interpreted to defy the rules I am working within, as it would mean that the song changes dramatically. I am partial to songs that feature such dramatic changes, but I do recognize that it may not fit every song (or producer/composer).

5.3 Memory of Home

Runtime: 4:30

Genre: Electronic, ambient dubstep

Credits: Johannes Rønning

5.3.1 Track overview

SONG STRUCTURE - MEMORY OF HOME

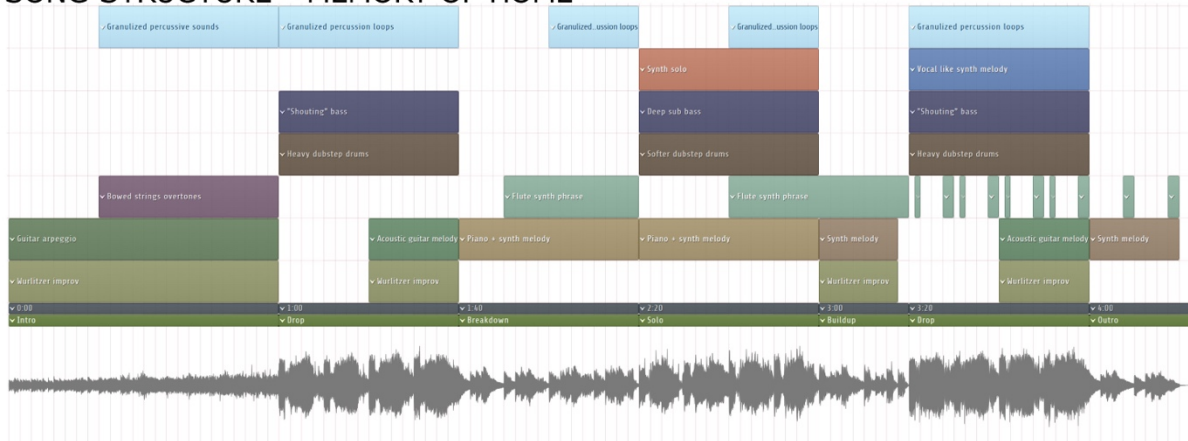


Figure 6: Song structure of "Memory of Home" (original image)

5.3.2 Creation process

"Memory of Home" was made as an experiment to deliberately introduce unpredictability to my music production process, in an effort to encourage spontaneous creativity. With no other aim than to create "something interesting", I recorded a clip of myself making a range of sounds and melodies and loaded it into a granular synthesizer. I programmed it to play two notes (a root and a fifth) and created random automations for all its main parameters; grain attack, grain hold, grain spacing, wave spacing and grain randomisation. The result sounded like a machine-human hybrid, with noises ranging from machine noises to vocal synth-like melodies. By slightly tweaking just one of these automations, the entire duration of the held notes would be drastically affected, meaning that there was no way to predict the characteristics/movement of the resulting sound. I exported a 15 second clip, then slightly tweaked some automations, exported again, and repeated around 20 times until I had a large selection of audio clips that I could cut/manipulate further. Through methodical trial and error, I eventually pieced together a selection of the clips into a coherent melodic line, which is now heard as the main "shouting" bass sounds in both drops (1:00 to 1:40 and 3:20 to 4:00).

The granulizing of my vocals ended up generating new melodic phrases, which I chose to keep as the harmonic foundation of the song. I further reinforced the melody by doubling it with a piano, added a sub bass, and some acoustic guitar chords (all heard together from 1:20 to 1:40). A kick and snare from Splice were also added.

The hard-hitting bass together with calmer piano/guitar reminded me of KOAN Sound, an electronic music duo I have drawn a lot of inspiration from for years. Since the music was already going in that direction, I decided it would be fitting to use some of their production techniques (available as tutorials on their Patreon webpage). One such technique is creating complex, textured percussion and melodies like this:

1. Load a longer foley texture or melody into a sampler.
2. Set a short decay so each triggered note is short.
3. Add an arpeggiator so the sound retriggers at a set interval.
4. Automate/randomize the read position to vary each triggered note.

This is similar to granular synthesis (each triggered note becomes a grain), but it's easier to quantize the timing to the song's tempo. I applied this technique to three different audio clips (one of me scratching a stack of paper, one of me rustling random materials on my desk, and one of me playing a Rhodes keyboard), resulting in two different texture/arpeggio layers; a "hihat" loop (heard during the drops) and a sporadic, tonal arpeggio (featured in many parts but most easily heard from 2:00 to 2:20). The evolving, frantic texture featured in the intro (heard from 0:20 to 1:00) was created in a similar way, but I mapped the read position to a midi knob that I tweaked in real-time while recording.

To add more "human" improvisation, I improvised some melodies/pattern using a Wurlitzer sound for the intro and drops, as well as added a synth solo part. For the solo, I recorded around 6 versions using an analogue synthesizer (Korg Prologue), from which I extracted the phrases/parts I was most happy with and put together as the final solo (heard from 2:20 to 3:00).

While improvising, I also came up with a polyphonic pattern that I thought didn't fit as part of the solo, so I recorded it separately and used it as a new background phrase (labelled "flute synth phrase") before, during and after the solo. Hearing this phrase together with the other elements gave me new ideas about using it as part of the final drop (as there are several natural pauses in the bass sound where it could fit). To make it match the energy of the drop, I doubled it an octave up, and layered with a sampled marimba sound.

At this point I had made most of the elements of the song through some form of unpredictable process/improvisation, but they were not properly structured yet. But as all the working material was now present, simply organizing and adding transitional elements was solved in a more focused, technical way, finishing the song.

5.3.3 Effects of creative augmenters

As Memory of Home is made from a deliberate experiment to encourage spontaneous creativity, there are naturally several points to cover. Generally speaking, I believe different applications of abstraction to have prompted most of the creative work.

1. **Abstraction of sound – inspiration from surprise:**

Abstraction of sound is used heavily as a production technique throughout the track, mostly through the use of granular synthesis (including the sampler trick from KOAN Sound). Some of the resulting sounds ended up mostly as a texture element without necessarily inspiring further creative processes, but I will however point out the main bass sounds that resulted from granulizing my own voice: Its emerging melodic and textural material surprised me and directly

inspired the main melodic phrase of the track. It also gave me associations to KOAN Sound, which in turn influenced many further creative decisions later on. I find it interesting that the abstraction of a sound, which normally describes removing its contextual information, in this case also added new contextual information (melodic content and connotations to KOAN Sound).

2. **Abstraction of control – controlling granular synthesis:**

While recording the evolving texture heard from 0:20 to 0:40 seconds, I was controlling the read position of the produced grains in real-time. As the source material was a longer clip of me rustling different materials on my desk, there was no rational way to correlate the position of the knob to the sound output. This means that my control over the sound was abstracted, which led to me having to use spontaneous creativity to listen and respond in real-time. I would also make the argument that I may have used specifically spontaneous/emotional creativity, as my “performance” was regulated based on how the resulting sound felt, rather than on any knowledge or experience.

3. **Improvisation – out-speeding deliberation**

Improvisation was used for recording multiple of Memory of Home’s elements. The most notable examples were the synthesizer solo, the improvised Wurlitzer layers, and the granulated texture heard in the intro (0:20 to 1:00). Both the Wurlitzer layers and the granulated texture was created in a single take, to avoid a build-up of habits or go-to patterns from practice. I initially attempted this with the synthesizer solo as well, but I gave in to my own criticism (as the first take didn’t feel “good enough”), leading to 5 more attempts. The earlier attempts were quite similar to the initial attempt, which showed that I was developing habits after just a single run-through. To combat this, the later solo attempts were performed with a deliberate focus on avoiding phrases from earlier takes. This also showed me how minimizing rehearsal is crucial for properly deploying improvisation as a creative augmentor.

4. **Divergent and convergent production:**

While producing Memory of Home, I noticed how the way I was generating lots of unpredictable elements/layers that I cut down and “made sense of” afterwards reminded me of divergent and convergent thinking (discussed in section 2.1.3). I suppose calling this way of producing music “divergent and convergent production” makes sense; through divergent production, as much possible material as possible is created through explorative and impulsive processes, and through convergent production, all this sporadic material can be assessed and made sense of through more critical and rule-guided cutting, editing, and structuring.

5.4 Kalimba

Runtime: 2:57

Genre: Lofi hip hop

Credits: Johannes Rønning

5.4.1 Track overview

SONG STRUCTURE - KALIMBA

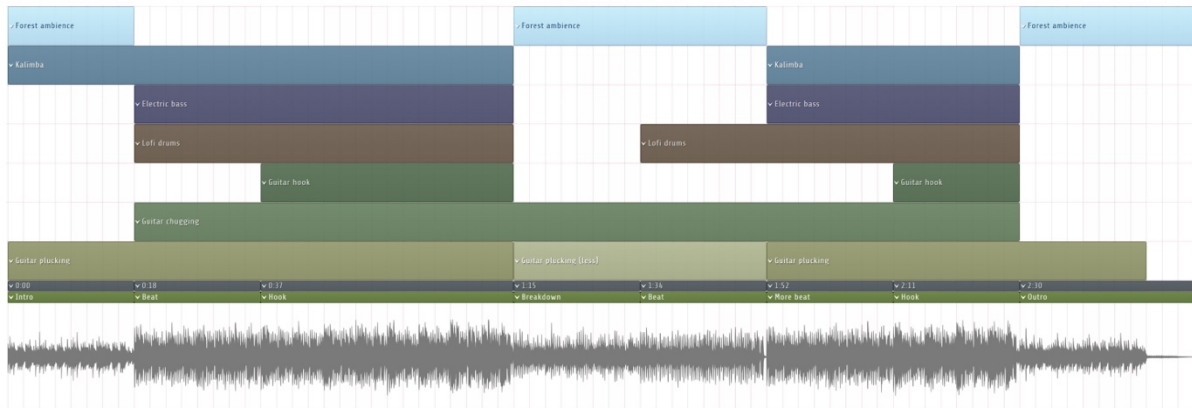


Figure 7: Song structure of "Kalimba" (original image)

5.4.2 Creation process

"Kalimba" was created as an experiment to recreate the style of a lofi hip hop track. I had drawn inspiration from the genre before, primarily the lofi sound mixing style, that I blended with other genres/styles. However, I never created a "true" lofi hip hop track, so I saw this track as an opportunity to do a music production equivalent of a master study¹⁶. To do this, I listened to a selection of lofi hip hop music and noted down several traits that defined the genre to me:

1. The track should be easy to listen to (not require much focus).
2. Instrumentals only.
3. Add/subtract layers to create variation, instead of creating entirely new sections.
4. Lofi sound: Emulate tape flutter, saturation, noise. Processed/synthetic drums.
5. Write simple melodies/chord progressions that evoke warm feelings.
6. Don't be afraid of repetition.
7. Use some real instruments like piano or guitar, bad recording quality is accepted.
8. Include nature sounds/ambience.

I began creating the track using this list as guidelines. As I didn't have any concrete melodic/harmonic ideas yet, I started with figuring out the drums. After having searched for individual samples, as well as experimenting with processing "real" drum kits (using the plugin 70s drummer by Native Instruments), I ended up using a preset in Native Instruments' Battery (drum sampling plugin), that included a wide selection of drum samples in the style I was looking for. Using this, I created a simple drum pattern in 4/4 that became the foundation of the track.

¹⁶ A master study is a learning technique used in painting, where the painter will try to replicate works by another painter to learn their techniques, composition, colour use etc.

The first tonal element to be created for Kalimba was the acoustic guitar “chugging” pattern (most easily heard from 1:15), which was played using only minor and major 6th intervals. It was created through improvising together with the drum beat until I felt I had something workable. As the chugging track felt a bit thin or empty by itself, I recorded three more voices in brighter registers to saturate the soundstage more. All guitar tracks were recorded with a single microphone, panned, and then processed through tape-emulating plugins (Gammel, created by me, and Tape Mello-fi by Arturia) that added fluttering, saturation, and noise.

I continued to record and layer other sounds like the kalimba (heard from 0:00), bass guitar (heard from 0:18), shakers (heard from 0:18) and a simple guitar melody (heard from 0:37). I played all the different layers together, which formed the parts I have labelled as “hook”. Following my guideline “Add/subtract layers to create variation, instead of creating entirely new sections”, I created the rest of the song structure and parts by simply subtracting layers from the hook. This process was not very creatively “inspiring”, but it was however fast and easy to complete the song by following this “recipe”.

As final touches, I added a phone recording of myself walking in the forest to the intro, middle section, and outro (for some genre appropriate ambience), recorded the whole track to an analogue cassette, and then re-digitalized it (for a final layer of flutter, saturation and noise that adds to the lofi aesthetic).

5.4.3 Effects of creative augmenters

1. **Mimicking – concretizing workspace:**

The creation process behind Kalimba was largely built on a concrete framework created by mimicking. By listening to and analysing the core components of the genre lofi hip hop, I was able to establish clear guidelines that I had to conform to. However, the guidelines seemed most strict when it came to sound and aesthetics, leaving elements like harmony, rhythms, and instrumentation open for personal preference. This means that the creative boundary set by using mimicking (in this case) was both clearly defined, yet large enough to allow for some creative freedom. I believe this is why I was able to complete this track without “burning out” the creative boundary (like what happened with the remix of Bed of Strings, discussed in section 5.2), using methodical and diligent work. This means that Kalimba was created primarily through deliberate-cognitive creativity.

2. **Abstract prompts – an unexpected effect:**

There is a point to be made that parts of the guidelines were more abstract (like “should be easy to listen to” and “evoke ‘warm’ feelings), but it seems they didn’t encourage much spontaneous creativity in this case. This is possibly because I personally made the guidelines, and used these abstract descriptions to describe sounds and impressions that I was already deliberately analysing. So these abstract descriptions function more as a personal pointer to specific experience than something that prompts new and spontaneous associations. In other words, the abstract guidelines we possibly made concrete by the fact that they were the product of analysis. This meant that they actually contributed to constricting the creative boundary instead of opening it up.

5.5 Icarus

Runtime: 3:18

Genre: Electronic, disco, pop

Credits: Johannes Rønning, Caroline Kristiansen (text, vocals, vocal recording)

5.5.1 Track overview

SONG STRUCTURE - ICARUS

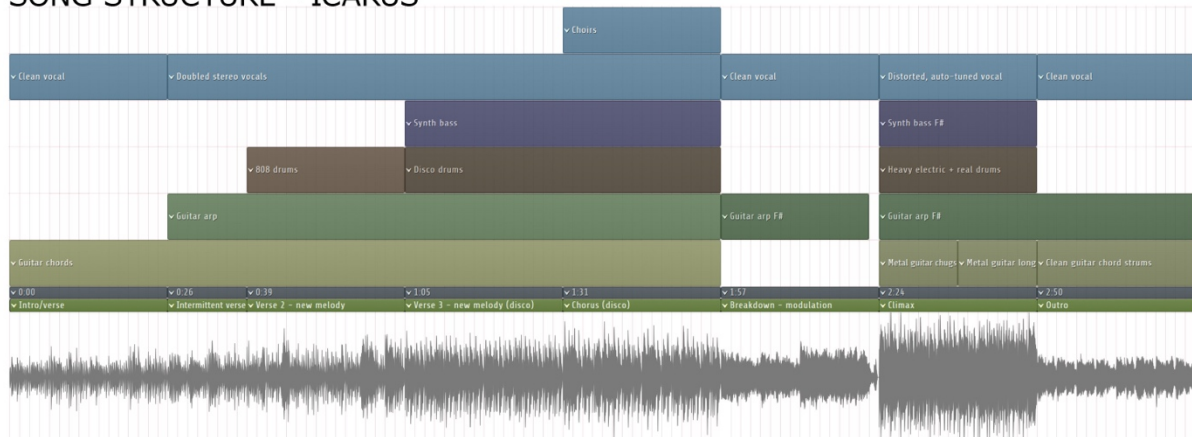


Figure 8: Song structure of "Icarus" (original image)

5.5.2 Creation process

"Icarus" is an ever-changing song made in collaboration with vocalist Caroline Kristiansen. What initially prompted this song was my purchase of an old, cheap cassette recorder/player (Fisher CR-W67), that I had intents of using for adding real tape coloration to my tracks. One of my early recording tests, made by recording clean electric guitar straight into the cassette, ended up sounding so good that it inspired me to create a track from it. This recording can be heard as the main guitar chord loop from 0:00 to 1:57.

I recorded a second, brighter guitar melody (heard from 0:26) as well as programmed a drum pattern using 808 drum samples from Native Instruments' Battery (heard from 0:39), both of which were also recorded to cassette and then rerecorded digitally. These loops were then introduced one by one to create a building progression.

While working out, I was listening to the new song "iiwannabe" by Bad Snacks¹⁷, a disco/house song featuring a pumping beat and energetic percussion, which suddenly made me realize that Icarus could benefit from a similar part. Following this, I made the section from 1:05 to 1:57 by adding a busier drum pattern, a synth bass as a tuned sub-kick, and several layers of shakers/percussion, to mimic Bad Snacks' instrumentation.

At this point, the guitar chord loop had looped continuously for almost two minutes, which I found to have become too repetitive. To break it up, I modulated from A major to F# major (but featuring the G major and A major, the minor 2nd and 3rd scale degree of F# minor), keeping many common notes from A major while simultaneously creating something new. I created a plucked electric guitar arpeggio that introduced the new chord progression (heard from 1:57). I also created a new, heavier drum beat as a new highpoint in the song (heard from 2:24).

¹⁷ "iiwannabe" by Bad Snacks: <https://tidal.com/browse/track/330718452?u>

Because of the repetitive aesthetic resulting from using loops and an “additive” progression, I wanted to add vocals as a more “living” element. I sent a draft to Caroline, who returned multiple tracks of vocal ideas. She had created and recorded completely different melodies and parts throughout the whole song draft, intended as a showcase of different ideas (so that we could pick a couple to work further on). However, I thought that it fit the song to not have any vocal section repeated, as it added to the progressive aesthetic already set in the song. Thus, I started mixing her recordings into the song, varying the width, depth, and colour of the vocal track for different parts.

The final element that was added to the song was the electric guitar chords (with accompanying synth bass) heard from 2:24 to the end. I wanted some guitar “chugs” (palm muting while strumming an electric guitar with heavy distortion) to build on the heavy vibe of the last climax, and discovered through exploration that I could reharmonize the existing chord progression (F#maj7 – Gmaj7 – A6 – Gmaj7) into something new (F#maj7 – Gmaj7 – A6 – Emin7 – D#min7 – Gmaj7 – A6 – Gmaj7), without crashing with the guitar arpeggio or vocals. This non-functional harmony added the finishing “attitude” to the climax. After the climax, the chords continue without the heavy distortion, leaving room for some final focus on the vocals before the song ends.

5.5.3 Effects of creative augmenters

Icarus was not created using any predetermined/deliberate prompts or catalysts. As both its origin (the guitar chord cassette loop) and large parts of its creation were driven by intuitive ideas (I rarely stopped to question what I was doing, I “just did it”), it is safe to say that spontaneous creativity played a large part. Although there was little reflection/intent regarding creative processes as I was producing, there are still several key augmenters used:

1. **Abstraction of sound – inspiration through coloration:**

As the original guitar chord loop was recorded to analogue cassette and then rerecorded digitally, the addition of slight pitch fluttering, saturation, filtering, and noise changed it from a disposable experiment to an inspiring song catalyst. Calling it an abstraction might be a stretch, but the sound aesthetic was changed enough to induce unexpected spontaneous ideas and inspiration. The continued use of this technique on other sound sources is likely an important subconscious influence over other creative choices made during Icarus’ creation, such as the usage of 808 drum machine samples (a “retro” sound).

2. **Mimicking – external inspiration:**

After obtaining spontaneous inspiration from Bad Snacks’ “i wannabe”, mimicking was used to build a creative framework for the disco beat part (1:05-1:57). Through analysis of the most defining elements from her song (four-on-the-floor kick pattern, percussion aesthetics, pumping “sidechain” feel etc.), I was able to produce with towards a concrete end goal. Deliberate-cognitive creativity could therefore be used efficiently for this part.

3. **Delegation of control – collaboration:**

Although the collaboration with Caroline was not as “back-and-forth” as it was during the creation of “If you ever wanted to come back”, it still had an impact on my creative process. When sending away my draft to her, I effectively delegated some control over the entire song’s expression. When confronted with her vocal additions, I was given new spontaneous perspectives on the structure of the

whole song, that helped deciding how to finish it. Since Caroline's influence was introduced so late in the song creation process, I believe it was "too late" to have major creative implications (again, unlike "If you ever wanted to come back"), that could have led to more drastic changes.

5.6 Ape

Runtime: 0:35

Genre: Hip-hop, electronic, experimental

Credits: Johannes Rønning

5.6.1 Track overview

SONG STRUCTURE - APE

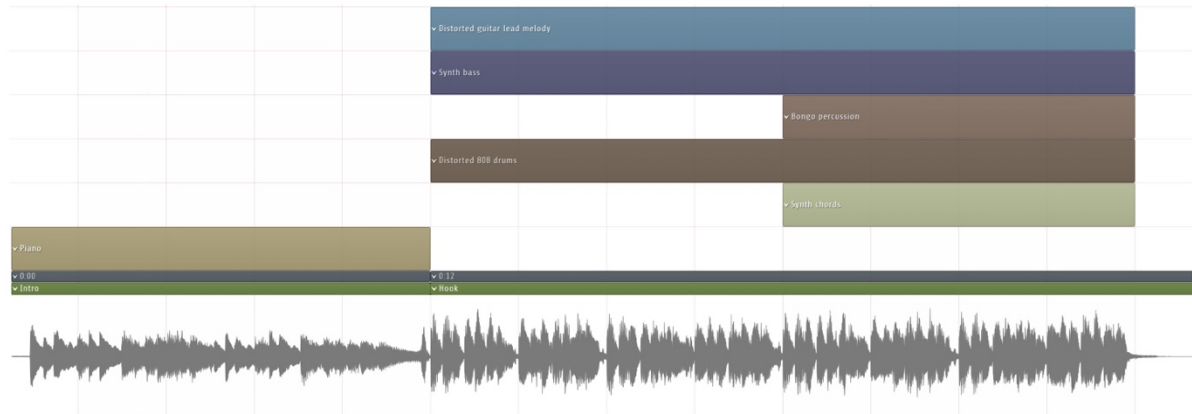


Figure 9: Song structure of "Ape" (original image)

5.6.2 Creation process

"Ape" was created during a period of creative block, during which I did not find inspiration to work on active projects, nor could I create any meaningful novel ideas to work on. I have in the past had success with using silliness and humour as motivators to kickstart creative output, so I started working on this song with the intent of posting as a funny reel on Instagram.

Since I felt unable to create my "normal" style of music, I set a goal to try to purposefully create something that challenges the listener (avant-garde inspiration), but in an approachable way (using humour and familiar style-features). This can be written as a prompt:

Create a crazy, wild, funny but cool tune that challenges the listener. Take it seriously, but don't be critical. Make it short, for Instagram (max 1 minute).

Based on this, I started sketching out a chord progression on my keyboard. I envisioned something whimsical and bright in sound, which in my mind translated to including several major #11 chords, frequent chord changes, and having the melody follow the chords instead of vice versa. I slowly built the progression by playing it over and over and changing or adding one new chord or melodic phrase each playthrough, until I was left with something that fit with the emotional criteria. The resulting progression is quite odd, ambivalent, and childlike (in a slightly uncanny way), never really feeling "home" or "grounded" at any point. The melody on its own sounds like it is in the key of D major and Eb major, while the chords sound like they are in the key of C major #11 and Eb major (C minor). Still, every part of the melody fits with the tonal content of the chord at any given moment, modulating back and forth together in a playful way. I recorded the chord progression/melody as a MIDI clip without a metronome and used this as the intro for the song (the midi clip is playing the NI The Grandeur piano library).

To continue the playful, childlike style, I wanted to play around with 808 style drum sounds, as they personally remind me of the pre-programmed drumbeats I would hear from keyboard toys as a child. The 808 drum sounds of course originate from the Roland TR-808 and are as such not inherently related to children's toys, but I still subjectively associate the sounds. I chose to lean fully into a quintuple groove, saturated with different rhythmic patterns from different drum sounds, to break up the simplicity and accessibility associated with the keyboard toys. I was amused by the idea of a "keyboard toy demo from hell", imagining a demo song that would scare children.

I chose to play into this association by recording a loud "BWAH" sample that I used as an abrupt transition into the drumbeat, introducing it with a jump scare. I also wanted to make this part of the song a bit more unsettling, so I chose to omit the chords from it, leaving only the melody and the bassline. This increased the tension between the melody and bass because the chord structures were acting as mediators of the abstract relation between the two elements. To replace the melody, I recorded it on an electric guitar, adding some vibratos and bends to make it livelier. I remembered the off-putting effect created by distorting the vocals together with the sub bass on "Xanny" by Billie Eilish¹⁸ and adapted the technique by grouping and distorting the bass drum and the melody together.

To finish the piece, I added a couple percussion loops like bongos and claves (that had to be stretched and cut to fit with the quintuple groove), as well as some effect sounds like a synth riser. The percussion layers reminded me of stereotypical jungle soundtracks from older games such as the Donkey Kong series, which is where the piece got its name "Ape" from (Donkey Kong is a gorilla). At this point, only about 4 hours after starting the piece, I considered it done.

5.6.3 Effects of creative augmenters

"Ape" is first and foremost built from a prompt, made up of several smaller abstract and concrete instructions.

1. **Abstraction of prompt – "Create a crazy, wild, funny but cool tune [...]":**
In the first sentence of the prompt, I am already presented with 4 abstract adjectives that should describe the resulting piece (crazy, wild, funny, and cool). Since these are not words that you can objectively tie to any specific sound or style, it forces a divergent, exploring process of trying to find a subjective common ground. Most interesting to me is the "funny but cool" part, which many could consider mutually exclusive concepts when it comes to art (both words could be used to describe art, but in my experience rarely together). I believe this dialectical relationship to have been an important influence on my thoughts and choices throughout the production process, such as contrasting simple melodies with thick and challenging rhythm patterns, creating something playful yet off-putting etc.
2. **Concretization of prompt – "[...] that challenges the listener. Make it short, for Instagram (max 1 minute)":**
The prompt to "challenge the listener" contains both abstract and concrete instructions. On one side, it is not specified in what way I should challenge the listener, and divergent thought is encouraged. On the other side, it can be

¹⁸ "Xanny" by Billie Eilish: <https://tidal.com/browse/track/121069661?u>

interpreted as being a concrete instruction to include musical elements that are normally not considered as mainstream, narrowing down the scope of possible options.

The last part ("Make it short, for Instagram (max 1 minute)") is a concrete instruction that helped create a creative boundary to work within. Since I knew the song would end up short, I did not have to worry about transitions, new melodies, chord progressions and variations to extend its length. I find limiting the length of a track to be a surprisingly strong motivator when composing/producing.

6 Discussion

6.1 The value of separating deliberation and spontaneity in creative music production

As I have done research and experimentation for this thesis, I have come to discover how complex and varied the creative processes behind music production can really be. Actions such as removing low-end rumble through equalizing, writing melodies that convey a certain emotion, and playing instruments, are all wildly different creative processes, that all require different types of skills/knowledge and attention to perform. Because of this, I find that online guides/videos that propose techniques to get more creative often work for *some* creative processes, but not for others.

During early theory-crafting, I divided creativity into two categories: Inspired and technical. This was based on the observation that some creativity seemingly could occur with no inspiration or “flow” present, simply by following guidelines, conventions, and rules (technical creativity), while other creativity seemingly could not be prompted, and had to come from inspiration (inspired creativity). At a later stage, reading about dual process theory deeply resonated with my own empirical discoveries; what I was referring to as “technical creativity” and “inspired creativity” closely aligned with the characteristics of deliberate and spontaneous thought, respectively. By differentiating between deliberate and spontaneous creativity, it became possible to find techniques (augmenters) that target more specifically one or the other.

Seeing as dual process theory was picked as a model because it related closely to my empirical discoveries, I acknowledge that some subjectivity is likely when it comes to the categorizing of different creative processes and augmenters. It did however make developing the creative augmenters a very intuitive process, as it was easy to relate the theory to my own ideas.

6.2 Productivity

The biggest reason for researching creativity and creating the creative augmenters, was to work more productively and get over creative blocks. I have finished more tracks/songs during the writing of this thesis than I have done in similar time spans previously, although a part of this increased productivity must be credited to the thesis itself; the concrete goal of creating an album, the thesis’ reliance on it, and the final deadline all contributed to a motivation of necessity. Taking this into consideration, reviewing potential productivity benefits of this research will be based more on subjective experience.

The most valuable takeaway related to productivity is perhaps an increased ability to self-reflect on creative processes. In situations where I would previously get stuck or slow down, I am now better able to analyse what type of creativity I am currently relying on, how to encourage/boost it, or how to involve other types of creativity. I believe this is a great resource for overcoming future creative blocks.

Another important aspect of increasing productivity through employing creative augmenters, is the ability to accept the restrictions or implications each augmenters may impose. For example, I would during experimentation sometimes generate prompts or restrictions that I felt uninspired to work on, because they didn't fit with my expectations. Therefore, a certain amount of open-mindedness or "creative plasticity" is required for creative augmenters to work optimally.

6.3 Sound and originality

An important question regarding the use of creative augmenters in music production, is how they might affect the "sound" and originality of an artist/song. Many artists have a distinct "sound", which refers to their typical instrumentations, rhythms, melodies, harmonies, mixing style and so on, which is often regarded as a defining aspect of them as an artist.

Looking at the songs/tracks presented in this thesis, there is a tendency for tracks built more on deliberate creativity to be influenced by norms and expectations (for example Kalimba and If you ever wanted to come back), and for tracks built more on spontaneous creativity to be more experimental and harder to define (for example Memory of Home and Ape). Of course this makes perfect sense, given that a prerequisite for deliberate creativity is to work within concrete guidelines, such as conforming to a specific genre or style. The prime example of this is Kalimba, which I would crown the most deliberate creativity-driven track of the thesis (an attempt at capturing the essence of lofi hip hop).

With this in mind, the more interesting question becomes whether tracks driven more by spontaneous creativity may undermine an artist's "sound", because the concept of "sound" in itself is a creative boundary (which would inhibit spontaneous creativity). It is hard to provide a definitive answer to this, seeing as all the tracks/songs I have created for this thesis are so different that I am struggling to define what my "sound" is in the first place. My subjective experience is nevertheless that using mostly spontaneous creativity results in more novel, experimental expressions, that could be argued to be a "sound" in itself. This further implies that the "optimal" distribution of spontaneous and deliberate creativity is subjective and genre dependent; some genres (for example dubstep, lofi hip hop, and trap) may benefit from a more deliberate, conforming workstyle, while others (for example indie, ambient, and experimental music) benefit from more spontaneous, explorative work.

6.4 Value of the album in illustrating creativity research

As discussed in the previous paragraph, the songs created for this thesis are so different that it is hard for me to define my own signature "sound" amongst them, which I also think makes them *stylistically* unfit for release as one single album. However, I do believe that this diversity has been helpful in illustrating different nuances of creativity research. As previously discussed, creative augmenters targeting specific processing modes (spontaneous or deliberate) will have varying effects on creative work depending on genres, expectations, and mindset. Therefore, creating songs/tracks within completely different genres and mindsets may have helped discover important variables to consider when reflecting, as well as provide a more varied set of results that more people can resonate with. I also hope that by exemplifying abstract and complex neuropsychological

concepts through concrete music and process examples, I may help the reader to more intuitively understand, and be more aware of, their own creativities inner workings.

7 Conclusion

7.1 Summary

Through the research and experimentation done for this thesis, I believe I have gained valuable insight into the way my own creativity works. By using dual process theory and Arne Dietrich's models of creativity, I have established a framework for understanding creativity, and through this achieved a vastly greater ability to self-reflect and analyse both *how* and *why* I do things the way I do. Combining this with analysing relevant historical work/research, as well as using music creation as practical experiments, I have created a list of *creative augmenters* that alter the creative processes behind my music production to encourage specific types of creativity:

To encourage spontaneous-cognitive or spontaneous-emotional creativity, conscious focus, attention, and understanding (deliberate processing) must be somehow inhibited or diverted elsewhere. This can be done by:

1. **altered states of consciousness**, meaning that a person is not fully conscious, and that their deliberate processing is not operating at full capacity (or at all).
2. **improvisation**, which necessitates immediate and constant responses that render the deliberate processing unable to provide solutions/ideas quick enough.
3. **abstraction**, which describes removing contextual information that could have been used to form a creative boundary from a creative process, meaning the deliberate processing has less (if any) relevant information to process.
4. **delegation of control**, which means giving away control over some real-time process to someone or something else, forcing the artist to react to and implement unexpected changes through lateral thinking.

Furthermore, to encourage deliberate-cognitive and deliberate-emotional creativity, a creative boundary must be established, where conscious focus, attention and knowledge can be used to efficiently explore the possibilities within it. Creative boundaries can be established through:

1. **concretization**, which imposes contextual frameworks or expectations onto a creative process, for example through concrete prompts, limitation, or mandatory inclusion.
2. **learning**, where a new creative boundary is established by registering and exploring new knowledge.
3. **mimicking**, which means to identify and replicate another person's work, creating a subjective replica of their creative boundary.

The creative augmenters have been tested and refined through the creation/production of six songs/tracks: If you ever wanted to come back, Bed of Strings (remix), Memory of Home, Kalimba, Icarus, and Ape. These serve to demonstrate how the different augmenters may be used to alter creativity in music production, as well as what effects they may have on the music's aesthetics. As each song/track is made in completely

different genres/expressions, I believe they illustrate the augmenters as good as they reasonably can without performing larger studies involving more people.

7.2 Implications for other artists/fields

I have noticed how being aware of my own use of the four types of creativity have had impacts on creative areas outside of music production. For example, when practicing my improvisation skills on the piano, I have noticed that I am much more aware of my focus; if I notice that I am thinking too deliberately about what I am playing, I can better divert my focus elsewhere so that my playing is processed more by spontaneous creativity (and as a result often improvise more fluidly or seamlessly). This implies that there are potential benefits for performing musicians in analysing the source of their own creative thoughts. Dancing, theatre, painting, and other fields may also likely benefit from this, although I have too little personal experience outside of music to assert in exactly what way.

7.3 Further research

7.3.1 Dual process timing models

An interesting topic that has not been covered or taken into consideration for this thesis, is the interaction/cooperation between the spontaneous and deliberate processes. Creative tasks such as producing music will rarely rely on exclusively spontaneous or deliberate thought, and instead use a combination of both. It is not fully understood how the two processes interact, so three different models have been proposed to explain it (Evans, 2007):

Pre-emptive conflict resolution model

This model suggests that individuals in a sense are able to choose one type of thinking best suited for a certain situation. This is supported by findings that it is possible to choose to think more freely and open, or more critically and cautiously in a creative setting. It is also suggested that this choice is affected by personality (“are you rational/critical, or a free thinker?”).

Parallel-competitive model

This model suggests that both the spontaneous and deliberate processes operate in parallel to solve problems simultaneously, competing to provide the best solution. This is based on findings that it is possible for people to believe in two contradicting ideas at the same time, suggesting each idea originating from a separate process. This is theorised to be a source of dialectical thinking (using two contrasting concepts to create a new, more complete concept), which is an important in several art forms (for example using positive elements to tell a negative story).

Default-interventionist model

This model suggests that when faced with any problem, the spontaneous process will start automatically cueing possible solutions, which the deliberate process may choose to intervene on. In this model, the role of the deliberate process is mostly to refine, elaborate and criticise the output from the spontaneous process.

It would be interesting to revisit the concept of creative augmenters while taking the dual process timing models into consideration. As some of these suggest that it is possible to “choose” to listen to the output of the spontaneous process, it might be possible to alter

some of the augmenters to more efficiently and specifically encourage spontaneous creativity, using this knowledge.

7.3.2 Pursuing objective results

As this thesis is based on my subjective artistic research, my results may not be applicable to the general population. Creating a research study that yields objective results may be near impossible because of how subjective creativity is, but increasing sample size and diversity would be a good start. A study could be made by recruiting several test subjects with varied creative background (ranging from no self-proclaimed talent to professional artists), giving half of the group creatively confining concrete prompts, and giving the other half abstract and diffuse prompts. This could be done specifically with music production tasks but could also include other creative tasks such as drawing or writing. Such a study might give a better look at how more deliberate or spontaneous creativity-driven tasks relate to both quantity and quality of the output.

7.3.3 Designing creative exercises for cognitively impaired persons

Through Arne Dietrich's model that divides the spontaneous and deliberate creativity further based on their knowledge domains (cognitive and emotional), I have discovered that some augmenters or combinations of augmenters (like abstract improvisation) may target specifically creativity from the emotional domain (most often spontaneous-emotional). As this type of creativity is independent of learned skill/knowledge and deliberation/focus, it is possible that persons with an impaired cognitive ability may benefit from creative activities that encourages it.

I have a personal concrete example of this: In 2018, I took part in the project "Dreambird"¹⁹ by Stina Stjern, which consisted of 29 musicians from Sund and Peder Morset folk highschools, around a quarter of which had various learning/cognitive disabilities. This ensemble performed a concert and recorded an album (also called "Dreambird"). One of the techniques Stina used to ensure that all musicians were included in the performance (regardless of "ability"), was to use a Korg Kaoss Pad together with a microphone. The Kaoss Pad is a live audio processor using an X/Y-pad as the main controller for its internal parameters. The mapping of these internal parameters to the X/Y-pad is highly abstract, meaning the performer had to intuitively improvise together with the singer using the connected microphone. Looking back with the knowledge from this thesis, this was an excellent example of abstraction of control used together with live improvisation to encourage spontaneous-emotional creativity, which evidently encouraged creative impulses and performance even from musicians with learning disabilities.

Inspired from this, an interesting continuation of this thesis' work could be to research more into different augmenters effect in individuals with impaired cognitive ability, to create more diverse and including creative exercises and ways to perform/create music.

¹⁹ More information on Dreambird can be found here: <https://stinastjernmusic.com/THE-NEW-NICKI-ORCHESTRA>

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Attachments

Attachment 1:

"10046_Ape.mp3"

Attachment 2:

"10046_Bed of Strings remix.mp3"

Attachment 3:

"10046_Icarus.mp3"

Attachment 4:

"10046_If you ever wanted to come back.mp3"

Attachment 5:

"10046_Kalimba.mp3"

Attachment 6:

"10046_Memory of Home.mp3"

Attachment 7:

"10046_Ape structure.jpg"

Attachment 8:

"10046_Bed of Strings remix structure.jpg"

Attachment 9:

"10046_Icarus structure.jpg"

Attachment 10:

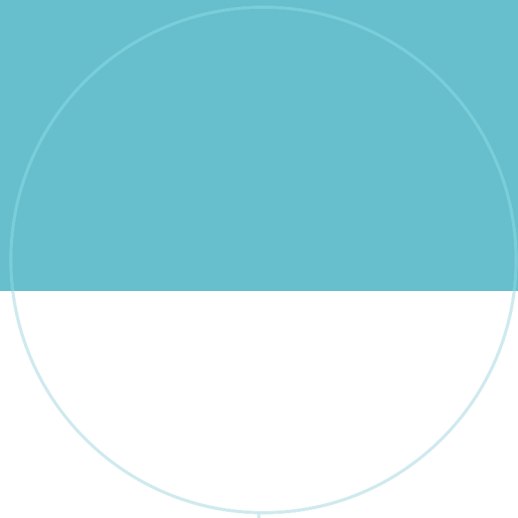
"10046_If you ever wanted to come back structure.jpg"

Attachment 11:

"10046_Kalimba structure.jpg"

Attachment 12:

"10046_Memory of Home structure.jpg"



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