Memory and Frisson
Through the Perspective of the Sound

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In the year 2018 I became co-curator and part of a newly created cycle of interdisciplinary arts named »*Sluhodvod*«. I will describe it to you - the cycle and the topics that we were dealing with, as well I will make a relation to the research topic »*Memory & Frisson through the perspective of the sound*« and how it inspired my original work. The name »*Sluhodvod*« refers to the auditory canal of the human body that defines the narrow passageway from the outer ear to the eardrum. In its concept »*Sluhodvod*« connected sound art that we hear with the context of visual arts. It formed a collective that included me, Mauricio Valdes San Emeterio, Tisa Neza Herlec and Ivana Maricic. We decided to create a cycle of four events. Each event had a different contextual background and contributed to the local art scene in Ljubljana (Slovenia). With the collective we organised four events during the year 2019. Each event dealt with a different topic. The topics were categorised, named and titled alongside the events as follows: »*Resonance*«, »*Parts*«, »*Invasion*« and »*Indicators*«. As the group began to collaborate it connected different fields and interests. The variety of the interests included musical and visual technology, composition, musicology, philosophy, sociology and phenomenology of the sound.

The first of the events, titled »*Resonance*«, in its essence was presented as an interactive sound installation. Each participant of the installation had the possibility to contribute to the process of the creation of the final result of the event. The participants were given the possibility to move among the rooms, halls and corridors, to play with the sound objects and instruments, to sit and listen or to simply observe at any time they wanted. Thus, »*Resonance*« took an action, the action that set up a connection between a concert hall, a listening room and a waiting-room. Each time the participants decided to move from one space to another they enabled a reflection on the sounds that they created themselves. As they entered the listening room their reflection on the creation itself transformed and became an electronically manipulated sound.

Each movement of the participants, as they changed their location from one space to another set to the activity itself a different experience of thoughts that were caused by the act itself. This movement enabled a reflection on sound that was created by them but this time as a *memory* of the process itself.

Click on the image to play the video. [1]

[1] "Sluhodvod Resonance," YouTube video, 2:36, posted by "Zavod Sploh," April 18, 2019, https://www.youtube.com/watch?v=pP1llkpXAJs.

With each movement they created a series of fluctuations or if we define it with the resonance alone as: *»The prolongation of sound by reflection; reverberation«* [2]

My observations of the event and the involvement I had with it, inspired me and caused a particular interest that I had in the following year of 2020. That year I composed »*Staticotion*« for accordion and electronics that dealt with the reflection of *reverberation*, *short-term memory*, *explicit memory*, *episodic memory* and its realisation through an abstract medium as sound. In the chapter *»Memory through the perspective of the sound«* I will be mentioning further associations with *»Resonance«* and will be analysing the technical aspect of the composition »*Staticotion*«. I will present an overview of the results that were collected through an online survey where, to the participants, the sound recording was presented together with the score. Moreover, I will present to you the musical form that was chosen and developed within my theoretical research on the formation of *episodic memory* and will present the reasons why I decided to limit the piece to the sonic monotony expressed in the environment itself and how the recall that refers to perception stored in *Long-Term Memory* and recognition that does not require depth of processing, formed the results of the survey. In *»Memory through the perspective of the sound«* I will present the various challenges that came along with the topic and the appropriations of the initial compositional approach and how the feedback from the accordionist himself influenced certain decisions to make »*Staticotion*« easier to process for the performer and the listener.

In the second chapter *»Frisson through the perspective of the sound«* I will introduce you to the human relation or reaction to sound that emerges as *frisson*. In this case 'frisson' which originates from French, refers to: *»A sudden, passing sensation of excitement; a shudder of emotion; A thrill«* [3]

This will be explained as a psychophysiological phenomenon that includes our physical and psychological sensation. Usually we relate this shudder of emotion to a reaction which is correlated to our memory-response concerning past experiences which in turn can then be related to musical, visual or any other form of art. This so-called reaction to our 'memory-response' can trigger certain physical reactions within our body as well, besides bringing a certain commemoration of our experiences in the past. We included and dealt with this phenomenon in the second of four events in the cycle of *»Sluhodvod«* that was named *»Parts«*. In this event we decided to look into the socially-influenced sound phenomena of *ASMR* (*Autonomous Sensory Meridian Response*), *Binaural beats* and *White noise*, among others. We were fascinated that there were research papers dealing with the phenomena as such and how our society applies these phenomena as a way to relieve psychosomatic symptoms and cure certain forms of mental disease such as: Anxiety, Depression, Insomnia, Chronic pain and even Stress. [4]

[2] *Dictionary.com*, s.v. "resonance," accessed March 21, 2021, www.dictionary.com/browse/resonance.
[3] *Dictionary.com,* s.v. "frisson," accessed March 21, 2021, https://www.dictionary.com/browse/frisson.
[4] Barratt and Davis, "Autonomous Sensory Meridian Response (ASMR): a flow-like mental state," 1.

The availability of these sound phenomena and their ease of access makes them accessible to a wide range of people. This specific ease of access made me more interested in the *Autonomous Sensory Meridian Response* as such and I started to explore its technical requirements for the reproduction of phenomena alone. In the cycle of *»Sluhodvod«* and its second event *»Parts«* we commissioned an audio-visual work from the Berlin-based artist Noemi Veberic Levovnik that related to *ASMR* in a perverted and exaggerated way. As we introduced the video to the public we realized that it was an extreme approach. This extremism made an *ASMR* video as a consensual form of sexually-related content but nevertheless its erotic nature brought me to the decision that I wanted to try to recreate *ASMR* through an acoustical instrument. This decision made me create an original work *»Two etudes«* for saxophone and electronics that we will be discussing in the chapter itself.

(Zavod Sploh, 2019) [5]

In the second chapter of this research I will introduce the conceptual background of the 'etudes' identity and introduce you to the technical requirements that were taken to form and recreate the *ASMR* audio world through the environment of an acoustical instrument. I will present to you the various techniques of sound recording and recording devices and will explain how I approached the performance from my perspective as well as introducing you to the opinion of the audience and their reflection on the performance of the etudes. We will approach the historical preview of *ASMR* and its psychological relations to our everyday virtual and physical environment and I will connect it to the historical references of *frisson* and its relation to our memory that is related through the emotional affinity of our self. I will introduce you to the results of the concert series *RCCXLIII* that took place in February 2020 in Studio Loos in Den Haag where I presented the *»Two etudes«* and what was the initial reaction from the audience. We will conclude the chapter on *frisson* with the topic of '*collective memory*' which usually refers to past traumatic experiences and predetermines references that are expressed in the present from a historical as well as a concert-form of approach. That is how we will be making a certain 'inner connection' a priority with which to connect between *memory* and *frisson* through the research *»Memory & frisson through the perspective of the sound«* itself.

[5] Zavod Sploh, *Sluhodvod 2, Parts, 2019*, March 18, 2021, photograph, Marcandrea, https://www.sploh.si/en/music/cycles/sluhodvod/sluhodvod-2019.

CHAPTER I

MEMORY THROUGH THE PERSPECTIVE OF THE SOUND

INTRODUCTION

In the year 2019 I received a commission from a friend of mine, accordionist and composer Luka Juhart. The commission comprised a new piece for accordion and electronics. As a starting point I included my early interests in the topic of *Memory* that was influenced by the mentioned interdisciplinary group »*Sluhodvod*«. Nevertheless, my beginning phase to compose the piece was based upon my improvisations at that time, as they were directly transformed into MIDI (that stands for Musical Instrument Digital Interface) [6] files and stored on my computer. The spontaneous nature of the improvisations provided me with an immediate reference point that served its purpose in my later musical material during the compositional process itself.

As I mentioned before, I have known Luka for a very long time and as well, I know his work and the potential of his playing techniques on the accordion as well. That frustrated me, due to the affluent amount of repertoire that he played and performed in the past and his virtuosic skill brought me to the world of unlimited possibilities. This is how my original work »*Staticotion*« became dedicated to him personally. Since improvisations constituted my main musical materials, the next challenge quickly emerged. This challenge in the first instance dealt with the question: »How to appropriate the improvisations into a conventionally notated score? « And secondly: »How to appropriate them in such a way that they maintain their identity and essence in a manner such as not to lose their improvisational characteristics? « Well, in this case we *do* lose the core of the improvisation itself. Let me speak in terms of the artwork alone; as the improvisation desires to become another thing in order to fulfill the identity of the written score, this becomes something else and this 'something else' distorts the initial character of the improvisation or artwork itself. Or as Theodor Adorno describes it in the first chapter of *Art, Society, Aesthetics*:

»Inherently every artwork desires identity with itself, an identity that in empirical reality is violently forced on all objects as identity with the subject and thus travestied«. [7]

From recorded improvisations I started to acquire more musical material that brought me to a point from which I did not know how to continue. At this stage I returned to listen to the discography and older contemporary works for the accordion that were recorded by Luka himself. Slowly my particular

[6] *Oxfordlearnersdictionaries.com*, s.v. "MIDI," accessed April 14, 2021, https://www.oxfordlearnersdictionaries.com/definition/english/midi?q=MIDI.

[7] Theodor W. Adorno, *Aesthetic Theory*, ed. Robert Hullot-Kentor (London-New York: Continuum, 2002), 29.

interests became influenced by the extended techniques on the accordion itself and this brought me to the realisation that I am interested in the fragile environments that are on the edge of being performable. For instance, if we take the overblowing technique of the reed that is triggered by an extreme pressure of the air on the reed alone, we sooner or later realise that they do not work on each accordion the same way they do on one we are familiar with. There are limitations, besides the fact that each overblow of the reed slowly damages the reed itself and can ruin it permanently.

From the fragile extended techniques that were particularly shaped and applied to the instrument on the other hand, the rhythmical material came from my improvisations as mentioned before. Along the way another challenge emerged as I questioned: »How to define the sonic environment of the piece itself? « At this point I stopped and put the piece aside for the next couple of months since I was working on other projects during this period of time. Nevertheless, along the way I became more interested in the topic of human memory. In January 2020 I travelled back to Slovenia to meet Luka in person. We read through the sketches that I brought with me and we debated on the extended possibilities relating to the use of the registers. We looked into the specific keys on the accordion that allowed us to overblow their reeds and that something hearable and applicable could happen as a result of the techniques we used.

This enabled me take the following step: to define the next interest as a non-verbal (referring to sounds as tone, pitch, volume, inflection, rhythm and rate) auditory information (as referring to music). While including the element of improvisation, as well as the extended possibilities of his particular accordion, an investigation into *»echoic«* or *short-term memory* began. While investigating this, further insight was acquired which defined the limitations in the process of the intake of information through a specific duration of time (i.e. 'how much 'information' can an individual process in a given amount of time?'). I did not realise that this will be my next development in the piece called *»Staticotion«*.

THE STATIC AND THE MOTION

As the name indicates, *»Staticotion«* is an invented word. It connects two words which combine the static and the motion. My burning question was: »How to combine these two into one unity? «

'Unity' in this case refers to the sense of creating a synthesis between something that has a lack of movement but is an ongoing process at the same time. Along the way there came an analogy of a »tree« and as Siegfried Kracauer once wrote:

»Undulating waves, moving clouds and changing facial expressions ... conveyed the longing for an instrument which could capture the slightest incidents of the world around us – scenes

that often would involve crowds, whose incalculable movements resemble, somehow those of waves of leaves«. [8]

In this I took the perspective of a 'Tree' that tends to (as is common) stay in one place throughout its life. And this 'tree' provided me with a perspective on the idea of 'the static through 'motion' which then extended to the furthest contexts of 'environment'.

Returning to the compositional process this image of a 'Tree' offered the following solutions. The use of a static harmony provided me with the quality of being static while, on the other hand, the voice leading - executed in a more diverse or rhythmically variable way - enabled the motion. From the perspective of a contrapuntal flow between the one that lacks in movement and the one that progresses, I combined my improvisational material and the motionless harmony through an unconventional type of form. At this point the investigation into memory and its limitations in the capacity of the amount of information that can be processed inspired the creation of the form. Along came a text by Howard Eichenbaum which mentions that:

»Human memory is encoded; events in the world (including events in the body and brain) cause changes in the micro-structure of the brain that persists over varying amounts of time. These changes take the form of differences in the "strength" of connections at gaps (synapses) between nerve cells (neurons). These connections regulate the flow of electrical charges trough neurons. The term encoding indicates that these changes form mental representations of events, which are created in a context of their meaning to a particular person. In order to persist, a memory must, to some extent, be related to what an individual already knows«. [9]

This knowledge made me realise, as I later found out, that as memory occurs, we do not recall each time a *specific* memory, rather we recall a *personal interpretation* of the memory itself. This 'interpretation', which with each recall becomes more and more distorted and along the way changes memory as we have perceived it, gradually becomes something else altogether. I mentioned earlier that the intake of information is 'limited' by time. Within 4-30 seconds we construct a short-term memory. [10] This was a breaking point where I decided to play with the human capabilities in the process of an intake of information. The formation of the form was subsequently related to the so-called 'chunking' technique. I knew that at this point I wanted to include a chunk of information – 'chunk' in this sense relating to the systematic *storing* of information (or 'chunking'), where larger amounts of information are divided into smaller parts and in this way are processed more effectively. Practically speaking, that we can learn more, but not as we intake all at once, rather to intake and split up into smaller parts. Chunking subsequently divided my improvisations into smaller sections. The difference between them was that not once do any of them repeat or otherwise repeat in their original form. This

[8] Jordan Shonig, *Contingent Motion: Rethinking the 'Wind in the Trees' in Early Cinema and CGI*, in *Discourse, Vol. 40, No. 1* (Detroit, Michigan: Wayne Shorter Press, Winter 2018), 30-61, https://www.jstor.org/stable/10.13110/discourse.40.1.0030.

[9] Howard Eichenbaum, *Learning and memory*, (London: Norton, 2008), 267-268.

[10] Bob Snyder, *Memory for Music*, in *Music Psychology*, *Second edition*, ed. Susan Hallam, Ian Cross and Michael Thaut (Oxford: University Press, 2016), 168.

means that the connection or transition between afore-mentioned chunks was a sustained sound that related to the length of time that was needed for the moment of passing the information-intake each time as the next chunk appeared (e.g., sustained sound in the length of 4-30 seconds prevented the encoding of the information-intake of each chunk). I will now explain the theory of the chunking technique and what the importance is of a limited intake of information in forming our musical or auditory memory.

THE MNEMONIC TECHNIQUE OF CHUNKING

Chunking is one of the mnemonic techniques related to cognitive psychology that enables an improved short-term retention of material. It is absolutely inevitable that as we increase the amount of information, the more limited we become in the processing of the information through Short-Term Memory. Moreover, we tend to simplify or generalise the material that is more important to us in a subjective manner. When one's perception defines an event as being more important than another, we constitute a specific differentiation in the structure of music. Bob Snyder wrote that if we refer to musical form it is defined as:

» *... [a] timescale of musical phenomena that requires some kind of lasting mental representation (Long-Term Memory) for their comprehension. The process of chunking can lead to hierarchical organization in LTM, and most theories of the structure of long-term representations of music use the concept of hierarchy of varying degrees. Hierarchical levels in music may range from phrase groupings up to an entire piece ...* « [11]

Through the Chunking technique, we extend our mnemonic possibilities and as we reach our limitations in processing information through the STM (Short-Term Memory) we start to simplify or generalise our representations of the form. Why did I include the chunking technique in the form of the composition? The answer lies in the following text:

»*The musical surface is segmented into units of cognitively manageable size (chunks) – the actual groupings, phrases, and so on of the music.* « [12]

The 'surface' in my case refers to an unconventional type of musical form. I divided the form into cognitively (relatively short) manageable chunks. Since they were in constant development and their lengths were different they exceeded the possibility to hierarchically manage and generalize the form and its process. The intention was to prevent an encoding process of the information, where encoding relates to the conversion of something into a particular form. Our conscious 'consolidation', which indicates the action or

[11] Ibid, 173-174.
[12] Ibid, 173-174.

process of making something stronger or more solid, is prevented and neglected by the limited capacity of our explicit memory. In this particular case our explicit memory could help us to recall the form in a semantic (referring to meaningful or logical) way, that could help us with the understanding as a conceptual meaning of the configuration. The usual limitations of our capability to take in a specific number of chunks at one time during a musical form is usually up to 7±2 associated events in a sequence. Considering the load of information that needed to be processed by the listeners as well as the non-repetitive nature of the form, all together in the piece »*Staticotion*« this became a unique challenge for even experienced listeners.

Click on the image to play the video. [13]

In order to gauge the memory-intake I then took the following survey among a group of listeners, which lead to the following results as well an analysis of several questions and other feedback obtained. The collected results came from participants that were diverse in age but shared a common musical background relating to current or past studies in musical composition. The survey proposed 10 questions. All the questions were to a certain extent related to the limitations determined by our cognitive perceptions.

THE ONLINE QUESTIONNAIRE

Context and Complexity

The first question: »*Is the piece too long?* « referred to our subjective experience of »*Staticotion*« and the definition of »too long«.
Although one can be engaged completely in the listening process, one can experience only to the extent of one's developed sense of complexity in musical taste. Or if we are dealing with it in the way as Lutz Jancke wrote:

[13] "Staticotion (for accordion & electronics)," YouTube video, 11:27, posted by "Tilen Lebar," January 25, 2021, https://www.youtube.com/watch?v=MMV3nF-K5ps&feature=youtu.be.

» In the context of music memory, it is obvious that complexity of the musical piece affects how it is encoded, consolidated, and recalled. The more complicated and complex a musical piece, the more difficult it is to encode and remember it. However, whether we can learn and remember complicated and complex music also depends on our mental structure and the schemas we have available for music perception and music memory. Those, who have mental structures for complex music will find it easier to learn and retrieve them. Thus, there should be a strong interaction between the mental structure for music and the musical structure itself for forming musical memory. « [14]

As Jancke describes, this type of 'mental structure' for music is not studied explicitly in the music domain. In principle, the mental structure and schemas which relate to our music memory are not that different from the better-known 'classical' memory system. If we return to the question and deal with the complexity that came along with the composition itself, it showed that 87 percent of participants of the survey did not find the piece »too long« *(see Fig. 1)*. This confirmed that their engagement with complex music depends on our mental structures and that the background of the participants confirmed their commitment as they were able to follow the score in 73 percent of positively confirmed answers *(see Fig. 2)*. As mentioned before the participants were currently or in the past already studying musical composition. In the final question I asked the participants: *»Were you able to follow the score? «* This question did not particularly imply that as composers we have a greater capability to follow the score, rather it proposed the differentiation between the intake of information through simultaneously auditory and visual stimuli. In this case the piece followed the score and the engagement of our auditory capabilities with our visual stimuli divided the two of them. It formed an easier correlation to the form. The connections between assembling the chunks of the form itself and the correlation with the visual interpretation of the echoic memory, which, in turn, relates to the *processing* of auditory information, enables in us an ongoing possibility to process and scan the visual interpretation of the score over and over again.

Hypothetically it enabled an easier recall of the information and simplified the task to a certain extent. As the material became more complex and un-relatable to the past events of the musical form, the visual representation of the score in combination with the mnemonic technique of 'chunking' helped to improve short-term retention of the material. By bypassing the limited capacity of *Working memory*, it allowed it to be more efficient. Bypassing the STM and encoding the information into LTM left to one's operating with explicit memory recall and response as a conscious choice. Being aware and to recall the information, in this case the musical form or the musical material, through the explicit memory does not omit the challenge of recognition itself. It rather implies that with the mnemonic technique it makes the memorisation more effective. The particularity of the music material or information forms a long-lasting interpretation through the mnemonics and helps us to achieve a successful recognition of the musical information.

[14] Lutz Jancke, *Music and Memory*, in *Music and the Brain*, *First edition*, ed. Michael H. Thaut and Donald H. Hodges (Oxford: University Press, 2019), 248.

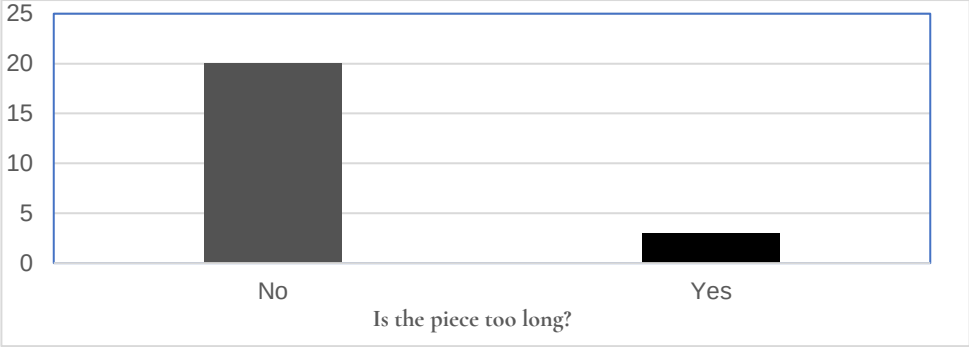


Figure 1 results of the Online questionnaire, Lebar, T. (2020) [15]

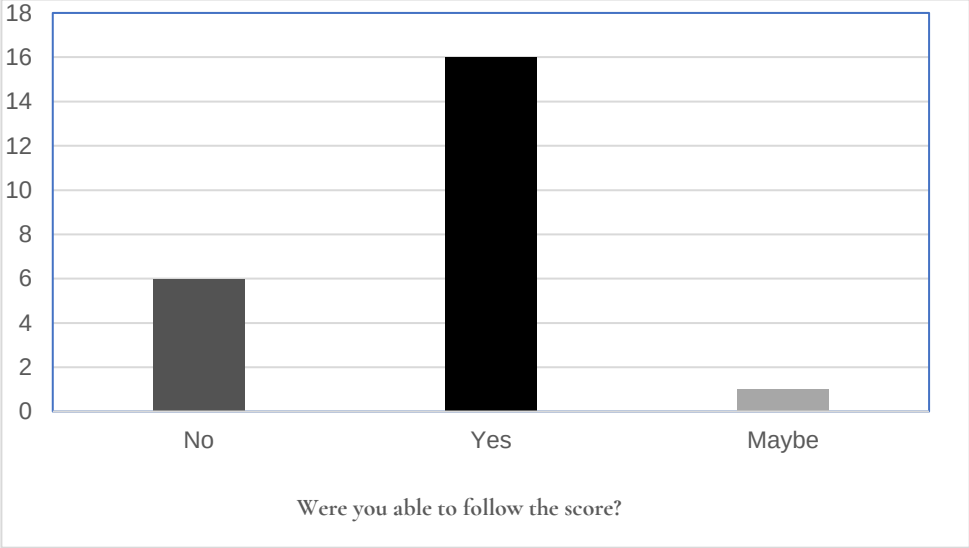


Figure 2 results of the Online questionnaire, Lebar, T. (2020) [16]

Immersion

If we return to the first question, we can partially agree that the subjectivity of time is related to our sense of *»flow«*. The *»flow«* is related to a mental state in psychology determined as a complete immersion in an activity [17] that affects our subjective perception of time and distorts it. I do not imply that our perception of »too long« or »too short« relates to the definition of *»flow«*. Moreover, our perception of »too long« relates to the engagement of our individual potential to follow the complex sonority of the piece. When we are engaged in the process fully (unaware or aware) and we encounter the consolidation of memory, we assure that the connection to the process of memorisation, through the phenomena of 'neural replay', makes the memory 'stronger' or more 'solid'. Enabling us thus to decode and recode the memory as a consequence of this 'consolidation'. Any subsequent relation to particular musical aesthetics, opinions or taste, which relate to the participants

[15] Tilen Lebar, *Online questionnaire*, *Staticotion*, (Unpublished, 2021).
[16] Ibid.
[17] Kendra Cherry, "Happiness," *The Psychology of Flow*, accessed April 21, 2021, https://www.verywellmind.com/what-is-flow-2794768#what-is-flow.

individually, can encourage and even provide a positive emotional response. That way the consolidation of the memory becomes adequate.

Standpoints of perception

The second question »*Can you distinguish between the static and moving material?*« showed that more than 90 percent of the participants were able to distinguish between them *(see Fig. 3)*. In retrospect however, I think that the question was not defined efficiently. From the standpoint that the perception of the static harmony gives the work a sense of motionless environment ('static' in this sense became expansive and had a double meaning), there are two possible routes for the processed information. One is on the *microlevel* and the other one on the *macrolevel*.

The *Microlevel* occurs through the chunking technique. The element of 'motionless' became defined as a sustained sound that served as a 'bridge' between the chunks. Its average duration was 18 seconds. It served a purpose to make them develop the musical information in chunks and coded them in the LTM. With this technique we can store bigger amounts of information by bypassing the STM and use the memory code to decode and recode the final information in the LTM.

The *Macrolevel* referred to the duration of the 'bridge' from the perspective that prevented the full encoding of the musical information. In this particular case the sustained sound prevented any consolidation of the constantly developing musical form.

Nevertheless, 91 percent of participants decided that they were able to distinguish between the difference of the static and the material in movement and decided to perceive the question from the perspective of the *microlevel*.

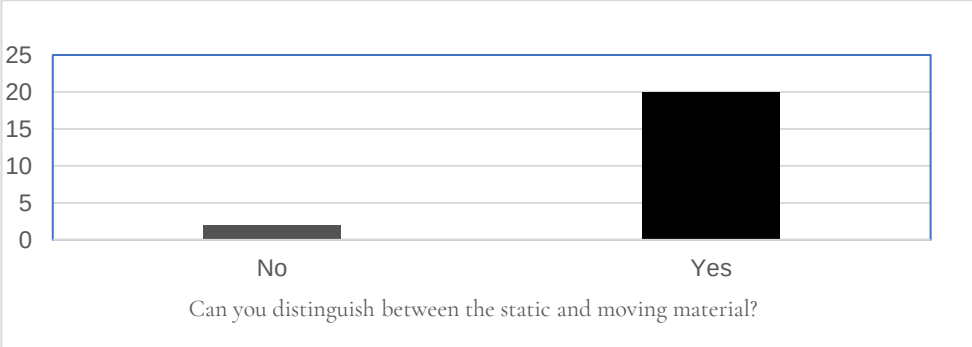


Figure 3 results of the Online questionnaire, Lebar, T. (2020) [18]

[18] Tilen Lebar, *Online questionnaire*, *Staticotion*, (Unpublished, 2021).

»Is the form of the piece confusing? « this question referred to the conceptual background and to the interpretation of a complex work without any obvious repetitions in the form and material itself. Let me explain that with repetition we enable to call the information into existence. Through repetition the musical material becomes widely acceptable and becomes more focused on certain things. In that way repeated musical material becomes more apprehensible and more natural to us. In terms of memory it is a way to consolidate the musical material. That makes it in the way 'stronger' and easier to recall. The intake of information was in this case, through its constantly developing form, more challenging. It was divided into multiple parts and made the task of storing the encountered musical chunks nearly impossible. What surprised me though is that only 26 percent of the participants were confused by the form of the piece. I want to bring across that in this particular development of the form I used an investigation on 'chunking' technique.

The amount of the chunks exceeded the number 9 (the afore-mentioned '7±2 associated events') and as George A. Miller wrote in *The Magical Number Seven, Plus or Minus Two* our limited capabilities of the intake of the information refer to:

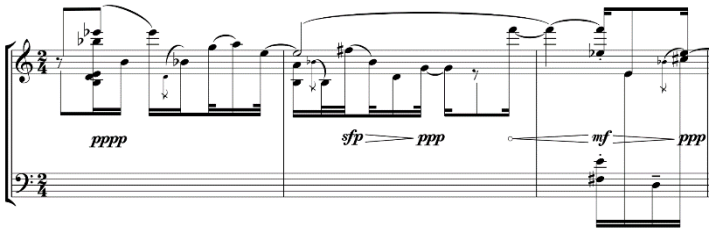
» ... [a] discrete statistical distribution does not depend upon the unit of measurement, we can extend the concept to situations where we have no metric and we would not ordinarily think of using the variance. « (Miller,1994, pp. 343) [19]

He implies that with the intake of information we need to constitute and adopt a newer concept. This concept defines the 'amount of information' as variance. Later on, he provides experiments that determined our capability of recognising and recalling to 7±2 separated events.

The form of *»Staticotion«* is divided into 14 different chunks and 11 sustained sounds (in total 25 events). The form was constructed as follows:

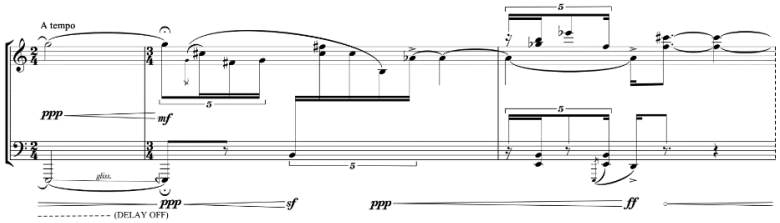
A, B1, C, B2, D, B3, E, B4, F, B5, G, B6, H, B7, I, J, K, L, B8, M, B9, N, B10, O with the ending as B11.

Every part of the development that was defined with the letters A, C, D, E, F, G, H, etc., presented chunks that were gradually becoming longer and more complex in their quality *(see Example 1, 2, 3 & 4)*. In their case we lost the consistency that enabled us to store or generalise the amount of information that could be consolidated and recalled.

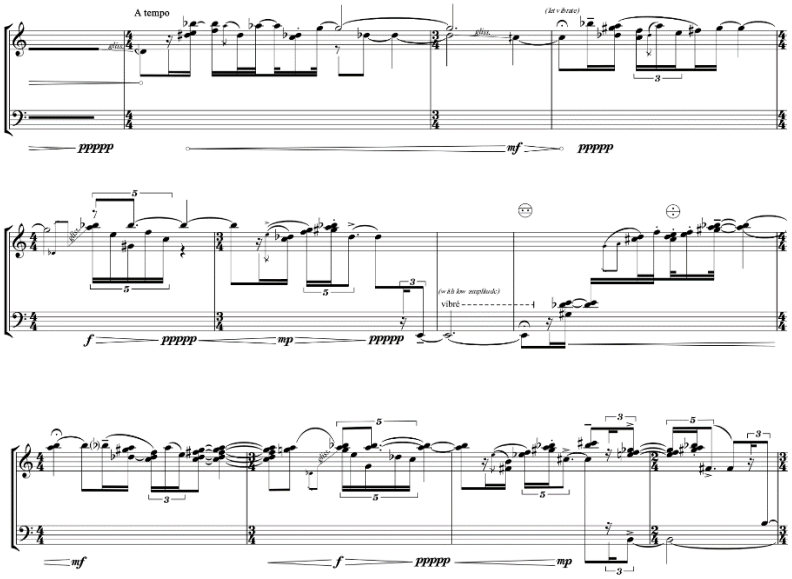


Example 1 'chunk' A, *Staticotion, Lebar, T. (2020)* [20]

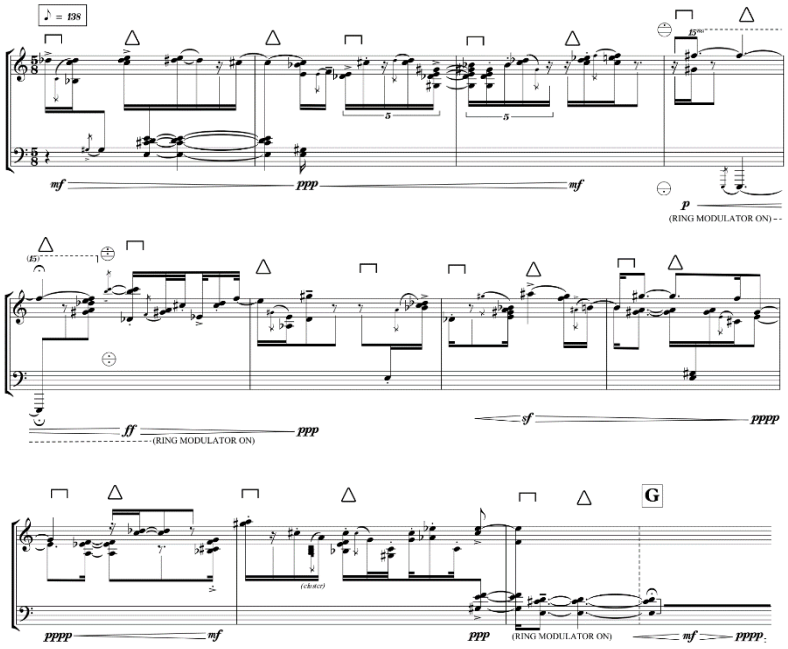
[19] George A. Miller, *The magical number seven, plus or minus two: Some limits on our capacity for processing information*, in *Psychological Review, Vol. 101, No. 2*, by the American Psychological Association, (Harvard University, 1994), 343-352.



Example 2 'chunk' D, *Staticotion, Lebar, T. (2020)* [20]



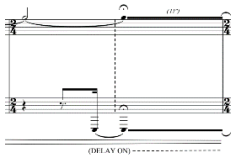
Example 3 'chunk' G, *Staticotion, Lebar, T. (2020)* [20]



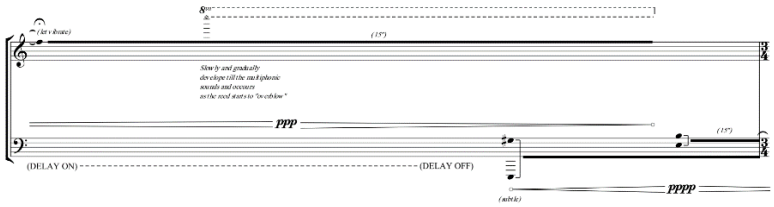
Example 4 'chunk' H, *Staticotion, Lebar, T. (2020)* [20]

[20] Tilen Lebar, *Staticotion (for accordion and electronics)*, (Unpublished, 2020), 1-3.

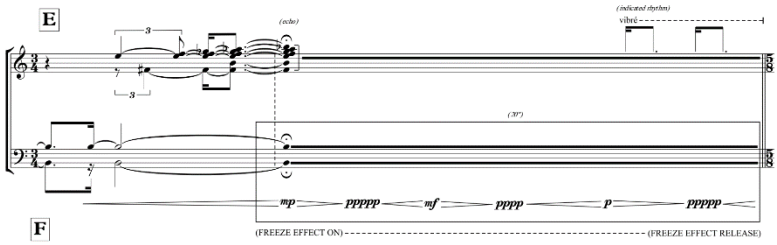
Each segment of B1, B2, B3, B4, B5, etc., became different in its length as well *(see example 5, 6 & 7)*. With the loss of consistency within the parts there came a 'loss of sense of time' as well as a 'loss of ability' to make a generalisation of musical material in a hierarchical approach where we would be able to characterise them. In this case the musical representations are considered more associative than hierarchical and with this we encountered the *implicit memory* response.



Example 5 'chunk' B2, *Staticotion, Lebar, T. (2020)* [20]



Example 6 'chunk' B3, *Staticotion, Lebar, T. (2020)* [20]



Example 7 'chunk' B6, *Staticotion, Lebar, T. (2020)* [20]

With each 'new' chunk we lost the common thread between them. With this approach we were able to subjectively perceive the overall experience. We were unable to process the number of chunks that we encounter. From this point we entered into the abstract conformation of the *»flow«* of the 'unprocessed information'. That brings us a unique experience of *»Staticotion«*.

The results of the questionnaire revealed that one of the participants referred to the piece as 'an ongoing climax'. The description included a comment that the experience of the piece became like a codified foreign language (i.e., it was difficult to perceive the form, but it could be perceived as the sequence of climax itself). It is interesting that even though there was no intention to bring the topic of 'climax' to the point of discussion, it appeared. The variety of participants that were included in the survey itself confirmed the incapable *explicit memory* response. Only the *implicit memory* response, which does not allow us to recall specific information on a conscious level, remained. We can thus perceive it as *a sequence of climaxes*.

Long-Term Musical Memory Representations

The beginning material of the composition could not be recalled by 57 percent of the listeners *(see Fig. 4)*.

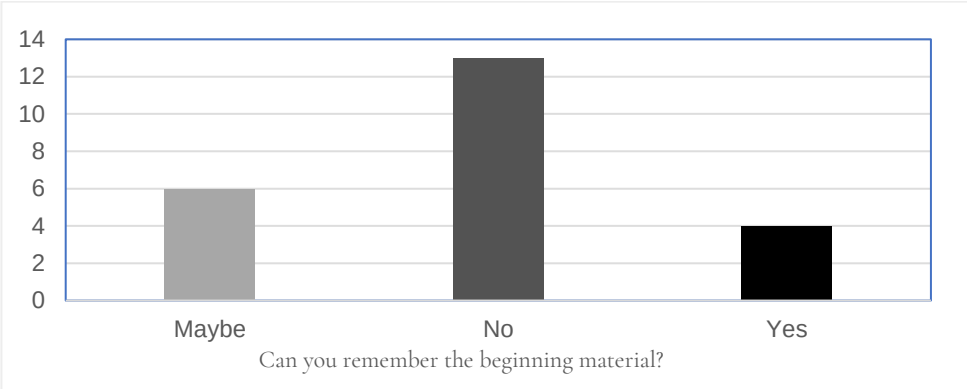


Figure 4 results of the Online questionnaire, Lebar, T. (2020) [21]

With the use of mnemonic technique and the material that was divided into chunks I concluded that after 11 minutes and 13 seconds (the total length of »*Staticotion*«) we are unable to recall any information from *LTM* that appeared more than 30 seconds ago. In this case Bob Snyder cites that earlier experiments on *Long-Term Musical Memory Representations* revealed the following:

»The results of several other studies (e.g., Karno and Konecni 1992) support the view that long-term relationships between musical materials are neither particularly accessible nor stable in memory. « [22]

In the question which concerned the remembering of the ending material, 83 percent of the participants reacted positively and confirmed the speculation that when there are 30 seconds passed from the intake of the musical information they could still recall the material itself. The intake of information throughout the process of chunking, memory code, decode & recode thus enabled and confirmed the results of the survey as positive. The answers confirmed the specific time-limitation (4-30 seconds) that allows the musical material to be accessible in our *explicit memory recall*.

Forgetting the Musical Chunks

An interesting thing occurred at the question which asked the participants if they could find any repetitions. The question was related to the *macrostructural* approach of processing the musical information. It demanded the *STM* response through an *explicit memory* recall on the intake of the musical information.

[21] Lebar, *Online questionnaire*.
[22] Snyder, *Memory for Music*, 175.

In 61 percent of the answers it was confirmed that they found the repetitions of the material *(see Fig. 5)*. But the question itself was not defined concretely enough. Though there definitely was a repetition of the variation of the material B1, B2, B3, B4, etc. the question was mainly referring to the connections between the constantly developing form (A, C, D, E, etc.) and the sustained sounds, which were in an average duration 18 seconds long. The intention was to make a limitation of storing the musical information into *STM* response that is limited within duration of 4-30 seconds. The sustained sounds were there with one intention: to 'erase' and prevent the capability to recall or memory code the musical chunks. Taking the perspective of musical repetitions on the more sophisticated *microlevel* appeared as well. Though they were not that obvious from the auditory perspective, they were more accessible from the visual perspective of the musical score. The insufficient formulation of the question made the understandability of the answers consequently more abstract and could be explained in various ways.

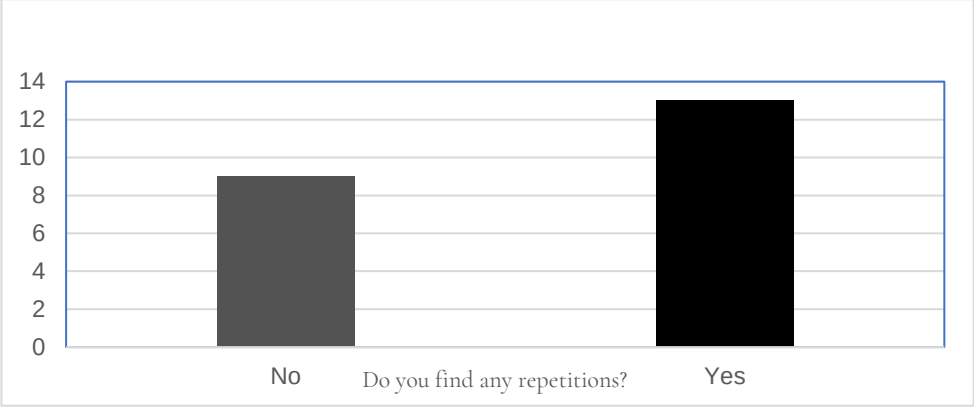


Figure 5 results of the Online questionnaire, Lebar, T. (2020) [23]

Perspective of the 'Tree' and Time

The overall tendency to approach and analyse composition on the *microlevel* surprised me. When I asked participants about the average duration on the static moments, none of them referred to the full length of the piece. Nor to the relation of the static harmony that was always returning back to the carrier of the frequency modulation technique.

It is interesting that the analytical perspective that relates to our *explicit memory response* overrules the listeners' point of view. As Gerard Grisey wrote in *Tempus ex Machina: A composer's reflections on musical time* 'we must relate the aspect of time from the perspective of a person that perceives':

»It is in fact the listener who selects, who creates the changing angle of perception which will endlessly remodel, perfect, sometimes destroy the musical form as the composer dreamed it. In turn, the listener's sense of time is in correlation with the multiple times of his native language, social group, culture and civilisation. « [24]

[23] Lebar, *Online questionnaire*.
[24] Gerard Grisey, *Tempus ex Machina: A composer's reflections on musical time*, in *Contemporary Music Review, Vol. 2.*

In the case of »*Staticotion*« the average duration of static moments lasted 18 seconds. On average the participants however perceived it as 41 seconds long. They perceived it twice the average length. I refer again back to the paper on time by G. Grisey:

» ... one can distinguish two approaches in the manner of composing and perceiving time, one favouring the moment and the immediate memory of the sound event, the other placing great trust in the cognitive memory of the listener which, we might say, would be in a position to gather, compare and hierarchically organise the elements of a musical discourse spread over a very long period of time. « [25]

Even though the *explicit memory response* was decoded, the challenge to measure the time-length was too demanding as such. The intake of information is as Miller wrote as 'amount of information' - variance and not a standardized unit of measurement [26] (e.g., the amount of information becomes dimensionless).

It is thus unreliable to relate our sense of time to the moments of 'static' development. We lose the sense and it becomes 'a moment itself' rather than an explicitly controlled environment where the perception stays in the frame of rationally explainable events.

Grisey as well defined the categories that, through a scale of complexity, allow for the continuity of perception of the phenomena of musical time. He defined them as a) *Periodic* (referring to repetitions, patterns, periodicity, etc.), b) *Continuous-dynamic* (acceleration, deceleration, intensity, etc.), c) *Discontinuous-dynamic* (avoiding too great predictability, suppression of certain areas of harmonics, etc.), d) *Statistical* (no possibility of prediction), e) *Smooth* (non-rhythm, seamlessness, lack of all temporal division) [27]

Viewed from this angle the perception of time in »*Staticotion*« varied from all these (i.e., *Periodic, Continuous-dynamic, Discontinuous-dynamic, Statistical, Smooth*) aspects and included in *Periodic aspect:* rhythmical variations and different lengths of sustained sounds, in *Continuous-dynamic aspect:* chunks of information which became longer and more complex, in *Discontinuous-dynamic aspect:* the overall returning to the variation of the carrier, in *Statistical aspect:* variety of the length of the musical material and in *Smooth aspect:* with continuation of the musical chunks, information became lost, no reference to the earlier chunks in the new sections could be occurred.

(United Kingdom: Hardwood Academic Publishers GmbH, 1987), 273.

[25] Ibid, 272.

[26] Miller, *The magical number seven, plus or minus two,* 343.

[27] Grisey, *Tempus ex Machina*, 244-257.

The quality of the information and the rate of change makes it really hard to generalise and to analyse the process of musical information. It made me conclude that the sustained sounds in the B parts themselves prevented consolidation of the memory-response of the musical chunks that were represented during the constantly developing form A, C, D, E, F, G, H, I, J, K, L, M, N, O. The rate of change within the form is too frequent and it is impossible for human listeners to process it in an effective way, or to recall it later, or remember it. But I have to conclude that the technique that I approached in the piece itself brought a certain 'fluidity' of sound. It enabled the piece to become a 'climax' piece. Due to the material in its organic 'form' and the limited sonic environment it helped to give it a fluidity in its essence. It became more of an experience that enabled a better engagement with the musical material over a long period of time, rather than a piece explicitly associated with the chunking or mnemonic technique.

FRISSON THROUGH THE PERSPECTIVE OF THE SOUND

INTRODUCTION

Nearly a decade ago I noticed for the first time the phenomenon of the *Brown note.* This phenomenon relates to an infrasonic frequency that in theory has a physiological effect on the human body: it causes the loss of control over our bowels. [28] Later on, I encountered more phenomena that were context-related and in theory physiologically effect the human body. As I later found out the phenomenon of *Low Frequency Noise* [29] affects us in more obscure ways. It connects the experience of a paranormal activity and explains it in terms of hallucinations that are generated through infrasound. Further exploration made me realise that analysing and experiencing the world around us could be justified through the perspective of the sound and its physics. It is a unique thing that can affect us in physical, physiological and psychophysiological ways. I will explain to you the differences and categorisations of all three bodily responses and present you an original work of my own which was mostly occupied with the psychophysiological response itself.

The »*Two etudes*« for saxophone and electronics were first presented during the *RCCXLIII* research concert cycle series (i.e., concert cycle series that allow an artistic experimentation within the 'classic' concert environment) in February 2020 in Studio Loos (Den Haag). They expressed my main interest in the sound phenomena of *Autonomous Sensory Meridian Response (ASMR)*, *Sound Emitting Devices (SED)* and the historical overview of military technology and the development of *Sonic Weapons (SW).* These sound phenomena and topics informed my realisations and specified my field of interest. What connects all the sound phenomena *ASMR*, *SED*, and *SW* is their effect on human emotions.

During this chapter we will focus on the second etude that approached my interest in the psychophysiological phenomenon of *ASMR* and we will compare it to the effect of *frisson* (i.e., 'shivers' or 'chills'). In comparison they overlap through multiple 'properties' and correspondingly the *ASMR* phenomenon uses the same terminology as the more-researched *frisson.* Due to their connections and inner relations, we will look into *frisson* as an explanation and approach of investigation into the phenomena of *ASMR*. Let me clarify that the

[28] *Wikipedia.com*, s.v. "brown note," accessed April 14, 2021, https://en.wikipedia.org/wiki/Brown_note.

[29] Fran van den Berg, *Low Frequency Noise and phantom Sounds*, in *Journal of Low Frequency noise, vibration and active control*, Vol. 28, No. 2., (Essex, England: Online), https://www.researchgate.net/publication/273078532_Low_Frequency_Noise_and_Phantom_Sounds.

ASMR phenomenon is mostly unexplored and has a contemporary history in scientific research. We will look into the research of Emma L. Barrat and Nick J. Davis where they questioned participants of the online questionnaire on their psychophysiological responses to *ASMR*. As part of the *RCCXLIII* research concert cycle series I will introduce you to the results which I gained through a public questionnaire and we will conclude them in comparison with the acquired reactions from the participants.

(Studio Loos, 2020) [30]

BODILY PROCESSES

Both phenomena *ASMR* and *frisson* are related and involve ourselves into the psychophysiological responses that are referred to as multimodal (i.e., characterised by several different modes of activity or occurrence) [31] experiences of internal bodily processes, external bodily processes and cognitive ones.

The Internal in this case refers to:

»Physiological responses that include internal bodily processes such as heart and pulse rate, blood pressure, blood volume, blood oxygen, respiration, skin conductance, muscular tension,

[30] Studio Loos, RCC XLIII, accessed on April 20, 2021, https://www.facebook.com/ResearchConcertCycle/photos/gm.632678780826647/1752919211505894.
[31] *Lexico.com.* s.v. "multimodal," accessed April 20, 2021, https://www.lexico.com/en/definition/multimodal.

temperature, gastric motility, pupillary and startle reflex, and biochemical responses. « [32]

The External bodily processes refer to:

»Physical responses that are external, readily observable, reflexive responses such as facial gestures, chills (including goose bumps, shivers, hair standing up, and crying), foot tapping, head nodding, finger snapping, and body swaying. « [33]

Meanwhile, if we return to the definition of the psychophysiological responses as they define the aspect of *frisson* and *ASMR:*

» ... [these] include both physiological and physical responses. The addition of "psycho" to the label indicates the role of the mind in physical and physiological processes. « [34]

Understanding the psychological aspect of the phenomena is related to our cognitive experiences of sound. The involvement of our cognition however does evoke something else as well. Besides the internal and external bodily experiences, we include bodily responses of *emotions*. These are connected to our psychophysiological responses through psychological ones and they determine our musical experiences.

Emotions, Valence and Arousal

At this point we need to understand the dualism of the perception on the theories of *emotions*. If we define them from a *cognitive appraisal theory* we include the explanation as:

» ... emotions are judgments about the extent the current situation meets your goals. Happiness is the evaluation that your goals are being satisfied ... Similarly, sadness is the evaluation that your goals are not being satisfied ... « [35]

Defining the emotions from the *physiological perception* defines them as:

» ... [a] perception of changes in your body such as heart rate, breathing rate, perspiration, and hormone levels. In this view, happiness is kind of physiological perception, not a judgment, and other emotions such as sadness and anger are mental reactions to different kinds of physiological stages. « [36]

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[32] Donald H. Hodges, *Bodily responses to music*, in *Music Psychology, Second edition*, ed. Susan Hallam, Ian Cross and Michael Thaut (Oxford, University Press, 2016), 183-184.
[33] Ibid.
[34] Ibid.
[35] Paul Thagard, "What Are emotions?" *Happiness is a brain process*, accessed on April 20, 2021, https://www.psychologytoday.com/us/blog/hot-thought/201004/what-are-emotions
[36] Ibid.

In the following chapter we will be dealing mostly with the unified account of emotions where the *cognitive appraisal theory* and *physiological perception* combine together.

Two terms, which are related to our psychological response to music (i.e., *cognitive appraisal theory*), need to be defined. They determine a further development within emotional response. The first one - termed *valence* - applies to an evaluation of an object, person, or event and tries to generalise our response as a positive or a negative one. The second one - termed *arousal* - directly relates to our aesthetic preferences, judgements and moods induced by music. Further connection makes all of them related within emotional dimensions. I will clarify the dimensions as *Emotional Induction* and *Emotional Perception*.

Emotional Perception is in general divided into multiple layers for understanding the musical expression of emotion. One of the layers is defined as *Icon,* which defines the musical associations related to evoked emotions and their relation to events in the past that could be related to that particular emotional association. The second layer is defined as *Intrinsic coding,* which combines one musical experience with another and enables the ability to generalise them and provide musical expectations. The third layer is *Associative coding* (when music evokes memory response of specific events during our lifetime). [37]

All three layers rely on the level of the expressed emotions within our cross-cultural specificity which relates to a particular cultural environment (for instance, when happiness is defined as a reflection of a specific expectation of society (e.g., for instance a spiritual wellbeing or material one) and relates to the *cognitive appraisal theory*.

Emotion Induction relates to multiple functional layers. We are not going to analyse all of them. We will take a closer look only at the ones that are specifically related to my original work *»Two etudes«*. The main ones are the following:

Visual imagery relates to our inner visual imagination, which can produce mental images of concrete landscapes, objects etc., which are related to our emotional character.

Episodic memory relates to the conscious recollection of a particular event from the listener's past that is "triggered" by the music. [38]

Musical expectancy relates to our expectations of musical events. They can be later recognised as elated (i.e., followed by a positive emotional response) or rejected musical events (i.e., followed by a negative emotional response).

Aesthetic judgment relates to an evaluation of the music's aesthetic value. It refers to the individual preferences that constitute our musical 'taste'. In the

[37] Patrik N. Juslin and Laura S. Sakka, *Neural Correlates of Music and Emotion*, in *Music and The Brain, First Edition*, ed. Michael H. Thaut and Donald A. Hodges, (Oxford: University Press, 2019), 286-291.
[38] Ibid.

chapter on *Neural Correlates of Music and Emotion* authors Patrik N. Juslin and Laura S. Sakka articulate this individual preference as:
» a subjective evaluation of the aesthetic value of the music, based on an individual set of weighted criteria (Juslin, 2013a); you may take pleasure in the exceptional beauty of a Bach composition, or may admire the exceptional skills of a great performer. « [39]

Frisson

Whenever we speak about a 'violation' of some musical expectations we refer to *frisson*. Its relation enables a psychophysiological response. As described in the *Bodily responses to music* by Donald A. Hodges and its subchapter *Chills:*

» ... Chills, also referred to as thrills or frisson, is a response to intense musical experiences that involves a variety of psychophysiological components. Chills can include shivers, crying, lump in the throat, goose bumps, hair raising on the back of the neck or forearms, or tingling along spine and extremities. « [40]

Multiple researches on *frisson* have concluded that it is a reliable phenomenon. In 1980 a research by A. Goldstein and in 1991 by M. Sloboda included information that *frisson* is experienced by 75-96 percent of the music listeners.[41] *Frisson* enables a *memory response* to a music that we can relate to personally. *The phenomenon* is predetermined by our past musical experiences or even our aesthetic expectations. When musical expectations are 'violated' the sensation of *frisson* is more likely to occur. There are two sub terms related to *frisson*. The first of these is the term *valence*, as a positive or negative emotionally-related response, where we are more likely to experience a positive emotional response to music that fulfills our expectations. We are more likely to experience a negative emotional response to music when encountering violated musical expectations; for instance, when an unexpected harmonic progression occurs. The second term is *arousal*, where we can trigger the phenomenon of *frisson* as well, moreover our aesthetic preference that refers to our evaluation of the music's aesthetic value will judge it more likely on the

»Perceptual, cognitive and emotional inputs that are then filtered through a relative weighting of the subjective criteria by the listener« [42]

We can briefly conclude that all the aspects of *arousal*, *valence* and *memory response* are predetermined by the individuals. Moreover, they overlap and enable a multimodal experience of *frisson*.

[39] Ibid.
[40] Hodges, Bodily responses to music, 190-191.
[41] Ibid.
[42] Patrik N. Juslin, *Emotional Reactions to Music*, in *Music Psychology, Second edition*, ed. Susan Hallam, Ian Cross and Michael Thaut, (Oxford: University Press, 2016), 197-206.

The psychophysiological response of *Autonomous Sensory Meridian Response* overlaps with *frisson* in the specific indication as an experience of a 'tingling sensation' within the human body. In the research of Emma L. Barrat and Nick J. Davis the *Autonomous Sensory Meridian Response (ASMR): a flow-like mental state* they mentioned that *ASMR* successfully triggered psychophysiological responses in more than 90 percent of the participants. The phenomenon indicates engagement:

»... where individuals experience a tingling, static-like sensation across the scalp, back of the neck and at times further areas in response to specific triggering audio and visual stimuli. This sensation is widely reported to be accompanied by feelings of relaxation and well-being. « [43]

Later on, Barrat and Davis revealed that 98 percent of participants experienced relaxation during the listening, 82 percent of participants confirmed that *ASMR* helped them to get a good night's sleep. In 70 percent of the respondents they confirmed its positive stress relief symptoms, while meanwhile only 5 percent of the participants confirmed that *ASMR* effected their sexual excitement. I was questioning: »Is there a connection between *arousal*, *valence* and *ASMR*? Do the two terms still play the main 'role' as in *frisson*? « In the vocabulary of *ASMR* I encountered mostly *sexual arousal* and not the *arousal* itself. Further investigation brought me to a conclusion with the definition of arousal as 'being awake and focused on a certain stimulus'. [44] Meanwhile in the journal on *More than a feeling: Autonomous sensory meridian response (ASMR) is characterised by reliable changes in affect and physiology (by Giulia Lara Poeiro, Emma Blakey, Thomas J. Hoster and Theresa Veltri)* I found that:

» ... Despite the potential parallels between ASMR and aesthetic chills, one point of departure between the two experiences is that ASMR is typically considered to be relaxing and soothing (it is often used as a sleep aid), whereas chills are associated with excitement and physiological arousal. « [45]

As we can see, both phenomena have a psychophysiological impact on us. The phenomenon of *ASMR* and its contemporary history however do not include that many researches. Moreover, it is increasingly developing. There are more and more researchers studying the phenomena itself. Although, it already serves as a medium and an alternative approach to deal with psychosomatic (i.e., depression, stress, anxiety, etc.) illnesses in modern society (i.e., users of YouTube, Vimeo, etc.). This evokes questions from a sociological point of view: whether or not the credibility and positive reactions from the

[43] Barratt and Davis, "Autonomous Sensory Meridian Response (ASMR): a flow-like mental state," 1.
[44] *Useenglishwords.com*, s.v. "arousal," accessed March 21, 2021, https://useenglishwords.com/arousal/.
[45] Giulia Lara Poerio, Emma Blakey, Thomas J. Hostler, Theresa Veltri, "More than a feeling: Autonomous sensory meridian response (ASMR) is characterized by reliable changes in affect and physiology," PLOS ONE 13(6): e0196645. (2018), https://doi.org/10.1371/journal.pone.0196645.

participants of the research (who are using *ASMR* as a medium to relief psychosomatic illnesses) correlate to the ease of access (i.e., referred to virtual platforms as YouTube, Vimeo, etc.).

Is the phenomenon unquestionably fulfilling the expectancies that are held by modern society (e.g., expectations to be 'cured' in 'virtual' way)?

My doubts settled my personal decisions to experience the *ASMR* through audio virtual experience, to reproduce the phenomenon within a 'naturalistic' setting (i.e., a setting outside of a laboratory environment, in my case a 'classic' concert form) and to take a public questionnaire from the audience after the 'research' concert cycle series in Studio Loos.

Multimodal experience

We already know that both phenomena *frisson* and *ASMR* have overlapping characteristics: both include the multimodal experience of sound. This experience is defined as 'paresthesia' in the vocabulary of *ASMR* (which defines the synesthetic experience of a physical phenomenon). The individual is engaged only through audio-visual stimuli of the experience itself, but he or she experiences a 'physical' aspect as well. This kind of multimodal experience was mentioned in the beginning of the 20th century. Marcel Proust in his novel *Combray* describes the 'flashbacks' of his childhood that are triggered by the '*Madeleine cake*'. These 'flashbacks' indicate something that has a specific relation to our memory response. Moreover, the connection between the sensory phenomenon of *ASMR*, '*frisson*' and the '*Madeleine cake*' triggers our emotional induction through an *Episodic memory response* that is defined as:

» ... a conscious recollection of a particular event from the past that is "triggered" by ... « [46]

In both cases it becomes a multimodal experience. The individual experiences something that is there in the presence itself or in a philosophical perspective such as discussed in Gilles Deleuze's book *Bergsonisms*, where he describes *Memory as Virtual Coexistence* and defines it as:

» a conservation and preservation of the past in the present. « [47]

[46] Juslin, *Emotional Reactions to Music*, 202-206.
[47] Gilles Deleuze, *Bergsonism*, (New York: Ur/one, Inc. Zone Books, 1991), 51.

Sound-emitting device as a psychophysiological response

The first etude presented an opening theme for the *RCCXLIII* research concert cycle series. With my Max MSP Patch I produced two frequencies at once. The lower frequency started at 50 Hz and slowly descended to 20 Hz *(see Fig. 7 & 8)*. The higher frequency was played simultaneously and started at 18,000 Hz and slowly descended to 16,000 Hz.

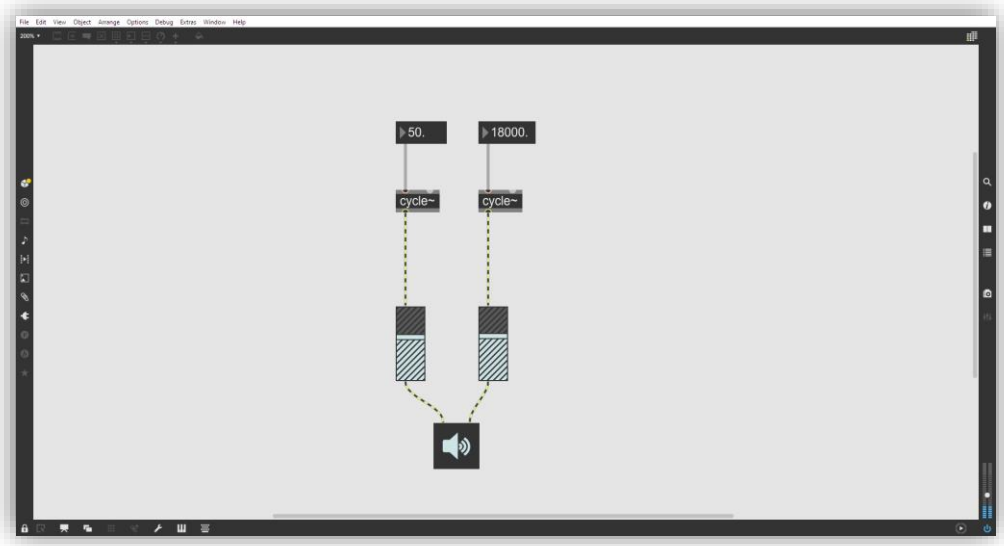


Figure 7 First Etude, Max Patch by T. Lebar. (2020) [48]

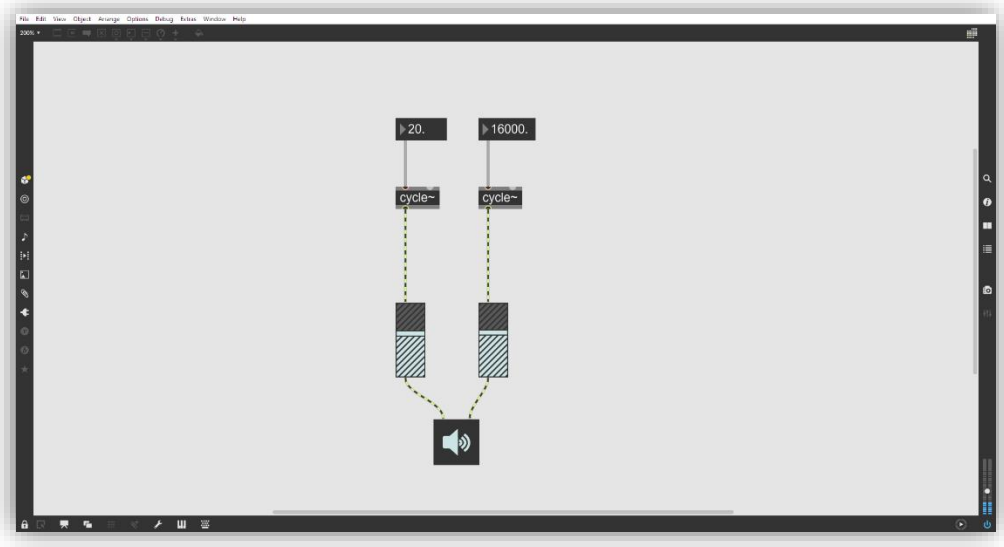


Figure 8 First Etude, Max Patch by T. Lebar. (2020) [48]

[48] Tilen Lebar, *Max Patch [print screen]*, (Personal archive, 2021).

I selected the frequencies based on information provided in a paper on the use of *Sound Emitting Devices (SEM) from the United States Patent Application Publication by Stapleton*. The information included specific indications of frequencies that are generated in a sound-wave device itself. In the paper I found information that summarizes the sound-emitting device (*SED*):

» ... [a] comprising oscillating means for generating a signal and sound means for generating a sound wave in accordance with said signal, said sound wave having frequency that is detectable by one or more subgroups of individuals being of the same species as the group of individuals. In particular, the sound emitting device is arranged such that said one or more subgroups of individuals are caused to move away from said sound-emitting device by said sound wave. « [49]

These kinds of devices are used to prevent public gatherings by subgroups of individuals and are able to disperse large gatherings in a given location. My burning question was:

»If the specific frequencies are presented in a different contextual background (i.e., in the 'classic' setting of a concert) could they achieve a different overall experience rather than disperse the 'gathering'? «

Instead of keeping their identity as an *SED* (e.g., which original purpose served to agitate and to prevent public gatherings) the frequencies thus became musical material for the audience.

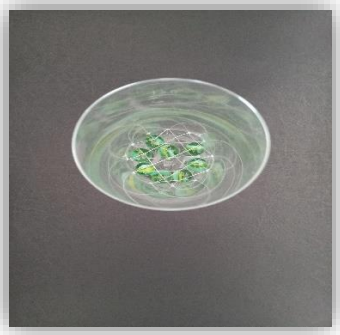
The participants were instructed to bring their headphones with them on the day of the event. This way the musical material that was streamed live and produced in a close proximity of sound (i.e., headphones) changed its initial purpose. The full length of the streaming process of the first etude took 20 minutes in total length. During the live stream I improvised on saxophone and combined it with the descending frequencies. The participants started to comment. Their comments were collected in the live stream chat. The longer they were exposed to the listening process of the frequencies the more it made them sick or anxious. However, it did not affect all of them. The experience affected only the age group between 19–30 years old. Participants within the age group of 40-70 years did not experience any sickness at all. Referring to the psychophysiological responses of the human body I concluded that the initial purpose of the *SED* does have potential as musical material. Especially in its ability to enable a certain experience of anxiety or undesired internal bodily processes such as gastric motility (i.e., gastric 'emptying' or even stomach 'pain').

The first etude served as an opening theme for the concert. No specific instructions or explanations were given. The listening experience led me to conclude that in this case the *SED* served its musical function and that the possibility to use it as psychophysiological response could be used among many

[49] Howard Stapleton and Merthyr Tydfil, *Sound Emitting Device*, (United States: Patent Application Publication, 2007), US 2007/0037691 A1, 3. https://patentimages.storage.googleapis.com/32/b6/64/ed334e55f3918c/US8031058.pdf.

other phenomena. As Steve Goodman describes, the sound can become a force. In the case of *SED*, it was used out of the initial purpose. It did not fit into the category of sonic weapons, rather it fit in the conceptual scheme of:

» Sonic Warfare then, is the use of force, both seductive and violent, abstract and physical, via a range of acoustic machines (biotechnical, social, cultural, artistic, conceptual), to modulate the physical, affective, and libidinal dynamics of populations, of bodies, of crowds.«[50]



Click on the image to play the recording of the First Etude. [51]

SECOND ETUDE

The second etude was designed while investigating the phenomenon of *Autonomous Sensory Meridian Response (ASMR).* The sound material referred to an extremely subtle sonic environment that included: rasping, crisp sounds, scratching, tapping, clicking, sound of air and pops. The musical material followed the phenomenon of *ASMR* and recreated the close proximity of the sound. In producing the sounds, I used mainly the mouthpiece, the cotton ligature, the reed and the neck of my alto saxophone *(see Fig. 8)*. In a 'classic' concert environment subtle sounds such as these would mostly stay unnoticed.

For the concert I used binaural microphones and performed the piece isolated from the audience. The isolated performance enabled me to trigger the *Visual imagery* of the participants. The second etude was performed backstage and was streamed live. With this approach I enabled an optimal

[50] Steve Goodman, *Sonic Warfare: Sound, Affect and the Ecology of Fear*, (Cambridge, Massachusetts. London, England The MIT Press, 2012), 10.

[51] "Through the perspective of the sound (Vol. 1) – First Etude," YouTube video, 22:25, posted by "Tilen Lebar," April 20, 2021, https://www.youtube.com/watch?v=jPFFZ4MNkII&feature=youtu.be.

musical experience for the audience that used headphones to listen to the performance. Through the use of the same binaural microphones that are regularly used by the *ASMRtists* themselves (i.e., artists that are creating the *ASMR* videos) the experience of the sound becomes very intimate through their close proximity. Positioning the binaural microphones in my ears, I created an approximated 'natural' environment of the sound as we perceive it. This recording technique constructs the positioning of sound within the same angle as listeners perceive it. With binaural microphones we design a 3D stereo sound environment.

Click on the image to play the recording of the Second Etude. [52]

Conceptual background and questionnaire

In search for a multimodal experience I decided to follow an unconventional approach. In a concert setting I decided to perform the »*Two etudes*« separated from the audience. I performed them backstage. The concept I departed from in this case applied to *Emotion induction*; more specifically, to the concept of *Visual imagery* which refers to:

» a process whereby an emotion is evoked in the listener because he or she conjures up inner images through a nonverbal mapping between "metaphoric affordances" of the music and "image-schemata" grounded in bodily experiences (Lakoff and Johnson, 1980): "a slowly ascending passage may evoke a visual image of a beautiful sunrise, which may then induce feelings of joy and optimism" (Thompson, 2009, pp. 137). « [53]

The reaction of the audience constructed more accurate representations of the experience. When I conducted a public questionnaire among the audience members two of the participants right away expressed that this was an *ASMR* experience and it reminded them of sophisticated electronic sounds (e.g., sounds which were not produced live). In a further discussion they elaborated

[52] "Through the perspective of the sound (Vol. 1) - Second Etude," YouTube video, 8:23, posted by "Tilen Lebar," April 20, 2021, https://www.youtube.com/watch?v=GPMSS_7BKO4.

[53] Juslin, *Emotional Reactions to Music*, 204.

that the experience reminded them of an intimate imagery. Their imagination brought upon multiple comparisons with the soft sounds that could be produced in a sexually-related activity. Their visual imagination and their representations reminded me of an *intrinsic* (i.e., inborn or basic) association with the close proximity of sound and the reaction to the musical material. Later on, two of the audience members expressed their opinion as a tingling, static-like sensation across the scalp, as the rest of the audience followed their path and concurred with their observations. At this point it confirmed its correlation to the phenomenon of *frisson*.

At the end, the audience confirmed my speculations and concluded my questionnaire as a successful creation of an *ASMR* environment within a 'classic' concert setting that actually evoked a psychophysiological response. Moreover, I questioned myself: »What happened and why did the opinion of only two participants lead to collective confirmation? «

Episodic memory and the collective thoughts

Let me explain that the public survey already constructed certain expectations. It was more or less a question of 'time pressure' (e.g., the event took a place late at night) and the 'elasticity' of individuals (e.g., when we are more 'empathic' to others' opinion or simply referring to 'politeness'). Since the performance did not happen in front of the audience it facilitated a sense of a visual imagination of the participants. This set a specific demand on the experienced collective imagination (i.e., experiences and memories within the community of the audience that were particularly related to the composers and musicians and their understanding of symbolic and other communication tools through sound). Imagine an empty stage where collective visual imagination plays its main part. This constructed an abstract visualisation of the performer in the space that was extremely familiar to the participants. As they were used to the 'classic' concert form (where the visual aspect of the performance helps to understand the events' development). This triggered their memories that were related to past performances in Studio Loos as well as their collective experiences and their *Collective memory*.
Jan Assman and John Czaplicka wrote in the chapter on *Collective memory and Cultural Identity* that the *Communicative Memory* (i.e., memories based on an everyday communication) [7] do rely on communication:

» *Through this manner of communication, each individual composes a memory which, as Halbwachs has shown, is (a) socially mediated and (b) relates to a group. Every individual memory constitutes itself in communication with others. These "others," however, are not just any set of people, rather they are groups who conceive their unity and peculiarity through a common image of their past. Halbwachs thinks of families, neighbourhood and professional groups, political parties, associations, etc., up to and including nations. Every individual*

belongs to numerous such groups and therefore entertains numerous collective self-images and memories. « [54]

If we combine the individual relation to the *Episodic memory* as ...

» a process whereby an emotion is induced in a listener because the music evokes a personal memory of a specific event in the person's life (Baumgartner, 1992). [b] When the memory is evoked, so also is the emotion associated with the memory. Such emotions may be rather intense, perhaps because the physiological pattern associated with the original event is stored in memory (e.g., Lang, 1979). « [55]

... we can conclude that the *Episodic Memory* relates to the *Communicative memory* through the influence of collective experience. The susceptibility and empathy of the opinion or emotional experience of individuals, constructs the recollection of the *Collective memory*. The sensation of the phenomenon of *ASMR* includes societies that do confirm its relief with psychosomatic illnesses. Furthermore, the 'collective' experience of the audience of the *RCXLIII* research series concert cycle constructed their own personal relation to the venue (i.e., Studio Loos). The concert venue represents a tool of 'communication' and a specific group-identity or other peculiarity that predetermines the collective identity.

This means that specific concert events are already 'intended' for specific public and that the 'profile' of that public shares something in common. That thing is their *Collective memory* (i.e., shared knowledge, experiences of the 'concerts', information, etc.). It determines the music scene as such and confirms the susceptibility for collective opinion. In my case the question that asked the participants about their experience on the »*Second etude*« revealed that they all experienced a 'tingling' sensation along the neck and became slightly 'aroused'. They all experienced similar visual imaginations, or at least agreed with the opinions of others. As well, they agreed with the indication that described the sounds as 'sophisticated electronics' with sexually-related imagery as well. The possibility to confirm such an evoked collective-visual-imagery however is inadequate. I did not provide an anonymous questionnaire and in this I did not collect reflections of the individuals, other than the collective ones.

[54] Jan Assman and John Czaplicka, *Collective Memory and Cultural Identity*, in *New German Critique, Spring - Summer, No. 65, Cultura,* (Duke: University Press, 1995), 125-133. *https://www.jstor.org/stable/488538?seq=1#metadata_info_tab_contents.* History/Cultural Studies. Duke, University Press.

[55] Juslin, *Emotional Reactions to Music*, 202-205.

CONCLUSIONS

The emotional response to music is related to our past experiences (i.e., *episodic memory response*) and later correlations with the music itself. The public questionnaire confirmed that *ASMR*'s live performance could be a successful and 'isolating' experience in the 'classic' concert form. It confirmed the psychophysiological response of the human body. The collective opinion confirmed the experience of an arousal. Overall, the first etude approved the theories on the long exposures of the chosen frequencies as a cognitive and physical experience of the sound. In my case these experiences were not particularly pleasant for the listeners. I do not know if it would work in the same manner without the close proximity of sound. With amplification it brings additional questions if it could even reach the required frequency-response through the system of speakers that were located in the concert venue.

One of the conclusions made me realise that even though we experience something individually (e.g., through headphones we 'isolate' ourselves from the other participants) we are still predetermined by our collective history, culture and other references that constitute our memories, knowledge, information and experiences. The *»Two etudes«* concluded and successfully realised my interest in creating an *ASMR* with an acoustical instrument. I see it as a potential to take an alternative approach towards new creations and to follow the under-researched path of the contemporary phenomena of *ASMR*. Overall, the research enabled me to investigate my long-term interests in the psychophysiological responses of the human body. It was interesting to investigate this specific field and to include it in an original work of my own. It definitely enabled me to approach the compositional process from a more conceptual point of view. To write a conventional score was in this case impractical. Rather, I predetermined musical material and operated intuitively with it during the performance. Nonetheless, the approach to record and to reflect on your sound through binaural microphones did challenge my experiences. As I later listened to the recording it impressed me with its spatial sonic environment. The experience brought me to a further investigation on ambisonic environments (i.e., a full sphere surround-sound format: in addition to the horizontal plane, it covers sound sources above and below the listener)[56] that are presenting my future occupations in musical composition.

In the first chapter I reached the conclusion that following a cognitive approach to mnemonic techniques and including them in the formulation of both form and musical material can offer an interesting musical result. Instead of conceptualising the compositional process from an 'inner' perspective of music (e.g., 'sound is just a sound') I approached it from the angle of

[56] *Wikipedia.com*, s.v. "ambisonics," accessed March 21, 2021, https://en.wikipedia.org/wiki/Ambisonics.

psychological perception. I experienced that it can be extremely demanding to formulate the whole original work in terms related to memory. At a certain point it enabled me to approach the process of composing from a perspective that is personally 'new' for me. During the whole research I had to change my perspectives constantly. From the pure musical, psychological, technological, conceptual one. As I included research papers from other authors I could compare the results. My approach to survey the participants of both chapters in *Memory and Frisson through the perspective of the sound* included collecting data. I approached the surveys from the experimental research approach. Where I set up a hypothesis (e.g., where mnemonic technique limits the processed musical information) I could confirm or disprove it through the online questionnaire. Later on, I realised that there was a positive confirmation and it served my initial intention to disable the possibility to memorise the introduced composition.

Overall, in future work I want to test this method in an original work written for larger ensemble. I am curious what will conjure up a collective perspective of the performers and the future audience.

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APPENDIX

I am including an interview with the accordionist and composer Luka Juhart. We recorded the interview through Zoom Meetings on Saturday 17th April 2021.

Click on the image to play the video recording. [57]

Interview with accordionist and composer Luka Juhart (translation and transcription)

Tilen Lebar:
How did you experience the performing part of the »*Staticotion*«?
Is the composition 'too long'?

Luka Juhart:
The final version was not 'too long'.
Nevertheless, the piece contains multiple sustained long tones. The initial idea of their duration was up to 10 times longer than it is now. This is problematic from the physical perspective of the accordion and its bellow capacity (e.g., it quickly runs out of air). Therefore, in its essence the accordion could be compared with a woodwind instrument.

You could compare it with a breath of a woodwind player (e.g., his or her capacity of the lungs). Moreover, a woodwind player can breathe circularly. But on accordion you cannot. In the initial version of the »*Staticotion*« the

[57] "Appendix - Interview with accordionist and composer Luka Juhart," YouTube video, 29:15, posted by "Tilen Lebar," April 21, 2021, https://www.youtube.com/watch?v=uIxgvHsvVP4.

sustained long tones had to be interrupted. I did not want that to happen. I wanted them to resonate along as it would be played in one gesture.

If I compare the 'static' material with the parts that are more rhythmical (i.e., the parts in 'motion'), their relation (i.e., what happened before and after) became intangible. For instance: it did not convince me when you're playing rhythmical figures for 10 seconds and after that you're sustaining a sound for 2 minutes. These were the two main reasons why I suggested you to change it. I proposed to you to make the long-sustained tones shorter. You know it yourself. I firstly recorded the original version with all the initial durations. You listened to it. How many minutes did the composition last in its total length?

Tilen:
It was 30 minutes long.

Luka:
Exactly! I think so too.

If we analyse these 30 minutes, only 6-7 minutes were the 'active' parts. Right? The rest were the sustained sounds. They were interesting until a certain extent. I did not know what will happen in the electronic part until the general rehearsal we had. For most of the time I was practising without electronics. We have realised that the length and the electronic effects are not that interesting to the listener. That is why we made them shorter. Well, I am satisfied with the current length of the piece. It is quite intriguing.

Tilen:
When we talked about the extreme length of the sustained sounds, their duration prevented you to keep the sense of 'time' or even the indicated tempo marks. When you played from point A, to point E, you lost the sense of tempo marks in point D and so on. Is that right?

Sort to speak, the long-sustained tones prevented the 'recall' of the tempo during the performance (i.e., performance in here relates to the first version of the piece »*Staticotion*«). Was that challenging for you?

Luka:
Definitely! Especially when I play something in a tempo where the eight note is marked as 104 bpm, or later in the faster tempi. Also, I had to sustain more than a minute-long tone and that got me lost while performing. I think that for the listener it caused the same experience (i.e., to get lost). I did it a lot of times, the way to play the exact time durations (i.e., with a stopwatch). Later on, I organised it in a way that I could count these parts in a certain tempo marking. I calculated how many beats are necessary to fill the 1 minute long sustained tone in tempo of 52 bpm. Then I played through as calculated. I did not count in seconds anymore. I would rather count beats in the tempo that was applied in the part before.

For me the idea of the piece (how I understood it) was that you build up a certain 'sound- world' that at certain moment stays still. This is the static for me. When I played I did not think in the sense of a 'time frame' or any other limitations. I lost my sense of time and tempo pretty fast. This is why I made my calculations and a 'system' that enabled me to perform the piece in a very precise way.

Tilen:
The basis of the whole composition was built upon the relation between the *static* parts and the moments in *motion*. I have a question; did you experience the static parts as the smaller 'chunks' of the piece or did you experience them as a part of the harmony? It was always returning to the carrier of the frequency modulation.

Luka:
Do you mean the harmony in the rhythmical parts?

Tilen:
I mean, in a more general sense of the piece. The static harmony was omnipresent. But what was the distinction that you made with the static feeling and the parts in movement?

Luka:
It is hard to say, I know that maybe you would like to hear something else. However, as a performer you play a certain piece, you practice it and spent a lot of time with it before the performance of that piece takes place. But this composition was really specific and I invested a lot of time into it, especially with rhythmical parts. The static parts I needed to practise way less. That is why it was interesting for me that the rhythmical parts became my inner thing. I already knew if there was a wrong note in the chord, or a wrong rhythm played.

I did 'internalise' the piece. At the beginning I was just marking the long tones (i.e. so he could sight-read it), but when we included the electronics, it opened a whole new world to me. It was a real pleasure for me to listen and to play these long tones. Unfortunately, I could experience it only twice on the last two rehearsals we had. During the performance on the concert we encountered some trouble with the disposition of the microphones and the amplification system. I could not hear exactly what was recorded and I think that public heard it differently. The microphones had to be set closer to my instrument than they were. Anyhow, I am looking forward to perform the piece in a live version for a live audience.

It is hard for me to say that the material came from one spectrum. What I can say is that I internalised the material until the moment I could sing it out loud, knowing it by heart.

Tilen:
I have a third question for you. Was it challenging for you to perform the complete piece? I am referring to the form of »*Staticotion*«. It was a constantly developing one. There are no repetitions of the material A, C, D, E, etc., and it is always interrupted by sections B. Do you think it is confusing to play it from A to S in this sense? Is it tangible? Do you find it interesting?

Luka:
I could see that the form of the piece has many parts. For me in the roughest description the form evolved as A, B, A, B and A, B, A, etc. The sustained sounds are the ones with electronics. They are B parts. You know, I have a subjective opinion about the piece. I listened to it many, many times. I played it for hours and hours. At the end I did not play it the way that the form would play a role in understanding it. I played it with continuity. Constantly. It is one piece or a 'chunk' for me! You don't hear the form when you're performing it. Well, if I listen to it now, I do hear the form and its constant development. But when you play and perform it, it is out of the reach to be analysed during the performance. It becomes like any piece from Magnus Lindberg or Pierre Boulez in its sense, it is fluid with no interruptions.

The electronic part made me exited. I had to stay extremely focused to perform my part in time and to react with the electronics. That is why I had to practice the long parts later on. I had to measure my capacity of air in the bellow and to react with the rest of the sound. As a performer I did not think about the chunks or the form. It was a one thing for me, a unity.

The 'active' parts were a bit different. The rhythmical parts reminded me an ABA form. A in 52bpm, B in 69bpm and A as repetition.
I internalised the overall experience rather than separate chunks.

Tilen:
In what sense can you connect the 'flow' to your performance? Were you able to 'operate' on a conscious level when you were immensely engaged in the moment? Could you follow your sense of rationality?

Luka:
In general, there are automatized things in the performance. You know yourself, and that while you are performing a lot of things can get out of control. The amount of time that you have invested into something becomes more or less automatized in its sense. Still, you need to think about a lot of things.

Whenever you are premiering a new piece it cannot be internalised as much as you wished. You need to think about cues, you need to pay attention to the sounds and interaction. You're keeping your consciousness awake. It comes along with the insecurities in the text, as well as other factors related to the performance (e.g., as balance, reaction to electronics, etc.). The form kept me 'present' in this way. I could sustain the same 'flow' and focus during the

performance. So, no. The conscious was involved. When I was encountering the fast-rhythmical figures, I could not process them on the spot. I played them as rehearsed.

Tilen:
What do you recall from your memory? Maybe you could specify a connection to the piece and the music material involved?

Luka:
I recall the micro [... starts to sing ...] actions. They were extremely pleasant for the fingers. You wrote a lot of things in one system and I had to divide them in between my left and right hand. That was a pleasurable experience! But well, there were a couple of uncomfortable moments as well, but in general it was really well made. It was complex enough, but not too much. I had a feeling that it was one of the pieces where you can really engage with the movements of your body. They resonated with me. That is the most interesting part. With the grace notes, etc., [... starts to sing ...].

On the other hand, the long tones could be longer. Maybe for the next time. We could develop the long tones with included sound layer. I think that the tiny little actions that resonated within my body will stay as my strongest memory of »*Staticotion*«. Playful and pleasant with the continuity of the sustained lines.

Tilen:
If we compare it with the analogy of 'tree': the 'tree' is static, but it includes multiple inner movements (i.e., branches, leaves, birds, wind, etc.). Could we compare the »*Staticotion*« with it?

Luka:
I would put it differently. The 'tree' is both static and in movement at the same time. I do agree with that. Moreover, I would even compare it with our lives. We are always moving around. We always walk the same paths. We have an idea about how liberated we are, how 'free' we are. We could go wherever, whenever. But we do not. We do not go anywhere. There are only few exceptions of people that immigrate from a small town in Slovenia to Somalia to stay there and to live there for the rest of their lives. Otherwise you're circling in your social circle. You go from there, to here, etc. It would be interesting if you have a GPS chip integrated in your body and you could check it just before your life ends. You could know then how many routes did you take. It reminds me more of that. We could go wherever, whenever, become whoever. But we do not. It will never happen. It will stay inside the circle. It is comprehensible with it. The 'tree' is more an analogy of the static. But I am referring more to an animal that lives in its habitus. It stays there. It can go wherever, whenever. But, it does not.

Tilen:
Habitus.

Luka:
That is how our society works. We could do whatever with our lives. But we do not. There are few exemptions that do it another way. But we do not have that idea in ourselves. We do travel, but we always return back to our 'home'.

Tilen:
Searching for our comfort zone in our cultural environment. We return to it over and over again. Is it a comfort, or something that we are familiar with? Or is it the fear we experience while letting things go?

Luka:
I think it is connected with us - the seek for comfort. We don't need anything, we have too much of everything.

The biggest migrations were always happening when the civilisation got pushed into it. Sometimes it was because of the lack of food, or sometimes it was because of war, or religion, or politics, or... Now we live comfortably. We are lucky to have had parents that could take care of us and to provide us the possibility to develop our talents, our art. To provide us an inclusion with our society. There are people that cannot do that. They are excluded.

At the moment I think that we all are in a critical situation, we do not know when will we be able to perform live or assure something. Right now, we are all kind of 'waiting' to get an opportunity to perform live.

Tilen:
We are waiting, yes! I know.