Studio Manoeuvres

Exploring historical, technological and aesthetic crossovers between electroacoustic music and experimental rock music of the late 1960s and early 1970s

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-Prologue-

From the late 1960s until the early 1970s the boundaries of music genres and styles, including popular music, were blurred. As it will be explained later, this situation was a result of sudden changes in the society, economy and the emerging music industry. Because of its social and technological nature, rock music could easily assimilate elements deriving from a variety of styles spanning from jazz and blues to classical and avant-garde. In addition, the shift from just capturing the performance to using the recording studio as a compositional tool led to an increasing experimentation that created many new possibilities for rock musicians. Undoubtedly, many rock musicians were aware of the experiments in electroacoustic music in the 1950s (*elektronische Musik, musique concrète*) and drew upon influences from the compositional techniques of avant-garde/ experimental composers. However, many questions arise about why and how rock music was connected to experimental and avant-garde electroacoustic music; and secondly, whether it is possible to trace common aesthetic approaches and production techniques between the two genres.

The aim of this thesis is to elucidate and exemplify possible intersections between experimental rock and the field of electroacoustic music, focusing mostly on production and compositional techniques. The framework of this research includes a historical overview of the context that experimental rock emerged from, exploring why and how certain production techniques were used at that period in rock music, and investigating into whether the aesthetic outcome of these techniques relates to experiments in the field of electroacoustic music. Furthermore, in parallel to this theoretical research, I attempt to develop a compositional approach which is heavily connected to the different aspects of the rock music being explored.

In Chapter I, I highlight the musical and technological context which experimental rock emerged from. In the first two sections, “Why experimental rock?” and “Instrumental media”, I try to explain which characteristics make it *experimental* and how some experiments in the field of popular music even from the mid 1950s created the conditions for further experimentation using the technological means during the late 1960s. In the section “Phonographic interlude”, I point out some examples from the field of classical and jazz music where technology played a crucial role in shaping the sound, form and the perceptual characteristics of the music. The cases of Glen Gould, Lennie Tristano and Miles Davis are addressed.

Chapters II, III and IV focus on the studio work of some rock musicians and the ways they were using technology to compose music. The heavily cited post-1966 era of the Beatles and their transformation to “studio musicians” is the subject of Chapter II. Some production techniques used in albums like *Revolver* (1966), *Sgt Pepper's Lonely Hearts Club Band* (1967) and *The Beatles* (1968, often called “The White Album”) are explored. The first section of Chapter III, concentrates on how Pink Floyd's spontaneous and improvisatory approach on playing music, led them to use the recording studio in a similar way. Their early experimental period is discussed, focusing on the production of *Ummagumma* (1969). In the second part of the same chapter, I extract information from an e-mail correspondence with Fred Frith (one of the founding members of Henry Cow) regarding his personal experience with recording technology and production techniques, to comment on different aspects of “studio improvisation” and its aesthetics. In Chapter IV, I focus on the studio work of Frank Zappa and The Mothers of Invention by analysing some of their recording and production techniques. Examples of music from his early albums *We're Only in it for The Money* (1968), *Lumpy Gravy* (1968) and *Uncle Meat* (1969) are given attention. Additionally, to shed some more light on some of Zappa's adventurous experiments, I use information from a personal communication with recording engineer John Kilgore, who observed

Zappa working on some of his early albums, and is one of the voices from the inside-piano conversations featured in *Lumpy Gravy*.

Lastly, Chapter V regards my compositional work and how it connects with the theoretical research presented in the previous chapters. I do a brief analysis of the study pieces I composed during the two-year research and I attempt to explain my methodologies, motivations and compositional processes regarding my bigger ongoing composition, *Studio Manoeuvres*.

-Chapter I-

Experimental rock: Contexts of music and technology

1. Why experimental rock?

Talking about rock music can be very challenging due to the multifaceted nature of popular music as a social phenomenon besides a sonic one, and the different disciplines involved in order to analyse and understand it. However, my aim in this section is not to propose another analytical model for the study of rock music but to explain what I mean by the term "experimental" in the context of rock, to highlight the musical environment that this style emerged from and lastly to justify my choices regarding the music being studied in this thesis.

From its genesis, which cannot be traced to one specific place or a very precise time period[1], rock music was a fusion of many idioms and styles (like rock and roll, rhythm and blues, folk, jazz, etc). During the late 1960s, owing to rapid and numerous socio-economic changes and an unpredicted upheaval in the music industry, rock expanded in many different directions. According to Eduard Macan (1997: 126) the division of a previously unified youth culture into many sub-cultures resulted in a market audience with many different musical tastes. Taking advantage of this fact, journalists and record companies created the illusion of many pop music subcategories by targeting their audiences with a more specific type of recorded product. *Progressive rock* was also one of these subcategories and the term 'progressive' helped record companies differentiate this product from the 'commercial' pop and, in conjunction with the economic boom of the era, to create a fast-growing

1 See Robynn Stilwell's chapter about the prehistory, contexts and musical origins of rock and roll in *The Cambridge History of Twentieth-Century Music* (Cook & Pople 2004: 419-427).

market based on young people. The so-called 'progressive rock' separated itself aesthetically from the rest of popular music and managed to blend art, avant-garde and experimental genres into one style. Nevertheless, my intention here is to focus mostly on the early experimental stage of progressive rock rather than to trace all of its complex stylistic manifestations.

Which are the elements that make rock *experimental*? Defining the term 'experimental' as it is used to describe music, John Cage said in 1955 that "[...] it is understood not as descriptive of an act to be later judged in terms of success or failure, but simply as of an act the outcome of which is unknown" (Nyman 1999: 1). We can find many parallels to Cage's words in rock music. One of the most obvious connections can be traced in the fact that no-one could have predicted that rock music could fuse very different styles together into one meta-style. Even as early as 1966, Frank Zappa's[2] *Freak Out!* was covering a pretty wide musical terrain – as Barry Miles points out: "The music covers all of Zappa's influences, from Cecil Taylor-style piano to Hollywood film scores, Stravinsky and Varése, backwards and speeded-up tape, sound effects and, of course, Doo Wop" (2004: 115-116). The crucial role that technology played for this to happen will be addressed later in this chapter.

What will happen if I do this? This could possibly be the most common thought that emerged during the creative process of making a rock album in the late 1960s. This exploratory approach in music-making was also amplified by the culture of psychedelia which (with the help of the drugs) expanded the way sound and music was perceived. Rock musicians, without being aware of or interested in the do's-and-don't's of mass culture, started employing a more experimental stance when making music (Salzman 2002) – welcoming mistakes, pushing technology to its limits, and acting without knowing the outcome beforehand. One heavily cited but nonetheless very characteristic example is the music of the Beatles, especially since *Revolver* (1966), where

2 See Chapter IV for more details about Zappa's studio work.

the band started to experiment with studio creativity because they wanted to change every material and make it sound like something else (Everett 1999: 33). This experimentation resulted in 'sound effects' that were not originally intended but eventually became standardised as tools for composing – Artificial Double-Tracking (ADT), reverse playback, speed playback alteration – all of these emerged from 'creative accidents' in the studio[3].

Additionally, this thirst for exploring new sounds resulted also in introducing instruments "foreign" to rock music as well as approaching the already established rock instrumentation in a more experimental way – giving the instruments other musical functions. Regarding the former, the use of string and wind sections, harpsichords, tablas, sitars and different kinds of percussion can be traced from the Beatles' *Sgt Pepper's Lonely Hearts Club Band* (1967) to the Mothers of Invention's *Uncle Meat* (1969). Regarding the latter, the use of the electric guitar as a tool to create sounds can be found in the way Syd Barrett (Pink Floyd) or Fred Frith (Henry Cow) were improvising – either by implementing extended techniques or by using a variety of objects to interact with the strings and the body of the instrument[4]. Besides the instruments, it is important also to address the role of the voice as well. From the moment that voice could be recorded and amplified, it could also be treated like any other instrument. During the late 1960s, vocals began to be approached as sound materials, to be transformed in order to enrich the sound palette of an album. The speeded-up vocal tracks in The Mothers of Invention's "Lonely Little Girl" (*We're Only in It for the Money*), John Lennon's slowed down voice in "Strawberry Fields Forever" and the super-imposed recorded sound poetry-like vocalisations in Henry Cow's *Legend* (1973) are some examples that reveal this shift from merely capturing a vocal performance to approaching its sound creatively.

Furthermore, it is important not to dismiss the role of improvisation in

3 See Chapter II for a more detailed description of the Beatles' production techniques.
4 See Chapter III about Pink Floyd's and Henry Cow's sound explorations.

shaping this exploratory character of rock where sound is concerned. Rock musicians often approached different aspects of their music improvisationally, in the studio as well as in a live context. Sometimes, parts of or whole tracks would be created out of recorded free improvisations. Tracks like The Beatles' unreleased "Carnival of Light"[5] and the Mothers of Invention's "The Return of the Son of Monster Magnet" (*Freak Out*) can be considered two very similar characteristic examples. In both cases a situation is created where groups of people "wander around" producing sounds (instrumental or vocal) freely in a studio space already set up to record (Thorpe 2008; Miles 2004: 113-114). Other examples could include Pink Floyd's and Henry Cow's sound explorations in the studio and live context, revealing their influences from free improvisation and free jazz (see Chapter II).

Moreover, what is quite remarkable about the experimental rock of the late 1960s is that it was open to any possible aesthetic transformation. Due to its social and technological context, rock music could assimilate avant-garde and experimental practices in a very natural way. As Luciano Berio puts it:

> The musical eclecticism which characterises its phenomenology . . . is not a fragmentary and imitative impulse [...]. Rather it is dictated by an impulse to accept and include – [...] to integrate the (simplified) idea of a multiplicity of traditions. . . . With the exception of the beat, loud and often unvaried, all its musical characteristics seem sufficiently open to allow for every possible influence and event to be absorbed. . . . [...]The all-embracing nature of rock is linked to the absence of any preconceived structure. From this tendency to accept the reality of things as they are, in various ways and attitudes, there derives a certain epic quality. . . .[6]

However, a serious weakness with Berio's argument is that he fails to explain how rock is connected to an "absence of any preconceived structure". Even if we agree to the fact that some internal characteristics of a rock piece are empirically constructed or made 'on the spot', it would be a mistake to think

5 See Vanessa Thorpe's article about the "Carnival of Light" here: https://www.theguardian.com/music/2008/nov/16/paul-mccartney-carnival-of-light (accessed on April 4, 2019)

6 See Berio's *Comments on rock* in Thomson's & Gutman's *The Lennon Companion* (2004: 97-99)

that *any* structure whatsoever is thought or designed in some sort of way beforehand. Moreover, what could be also added here is that this "all-embracing nature", as Berio characterises it, owes itself mostly on the media and technologies that rock music was conceived on and for. In simpler words, since rock music existed in the domain of recorded sound, it could absorb and transform anything that could be recorded. Therefore, we could say that it functioned more or less as a style of electronic music. The only possible reference point rock musicians could have had during the late 1960s when dealing with studio technology were the contemporary experiments in the field of electroacoustic music. Berio:

> [...] Some pieces (and especially the recorded ones) suggest something more than the idea of song, and develop into 'sound drama', made up of fragments of dialogue, of clips, super-impositions of different recordings and electro-acoustic experimentation: the form may be best described as collage (Thomson & Gutman 2004: 98).

Indeed, Berio's words can be exemplified by the studio work of the most experimental incarnations of rock music: the experimentation of the Beatles with studio technology in search of new sounds in tracks like "Tomorrow Never Knows", "I Am The Walrus", "Revolution #9"; or the adventurous explorations of the recording medium by Frank Zappa in albums like *Lumpy Gravy* or *Uncle Meat*. Nonetheless, it is important to mention that the influences between rock and electroacoustic music were not at all one-sided. At times, *musique concrète* composers like François Bayle and Bernard Parmegiani used samples from rock tracks as material for their compositions. Bayle's tape compositions, "Solitioude" (1969) and "It" (1971), feature rock musicians Daevid Allen (Gong, Soft Machine) playing some guitar parts and Robert Wyatt (Soft Machine) recording vocals[7]. In "Solitioude", one can also hear sound fragments from the Mothers of Invention track "The Chrome Plated Megaphone of Destiny". The same happens in Parmegiani's pieces *Pop'eclectic* (1968) and *Du Pop À L'âne* (1969) where sound clips from Pink

7 Information retrieved from discogs.com https://www.discogs.com/Bayle-LExp%C3%A9rience-Acoustique/release/233342 (accessed on April 8, 2019).

Floyd's "Let There be More Light" and Mothers of Invention's "Nasal Retentive Calliope Music" can be easily traced.

Having highlighted the musical context of experimental rock in the late 1960s, I think it is easily understandable that the recording studio and its technologies played crucial roles in provoking experimentation and shaping musical aesthetics in the context of popular music. In the next section we will try to explain briefly why different evolutions in electronic technologies were essential for rock music and how they defined ways in which it was made and experienced.

2. Instrumental media

In order to create the sounds for his electronic composition *Kontakte* in the Studio for Electronic Music of the WDR in Cologne between 1958 and 1959, Karlheinz Stockhausen had to 'abuse'[8] devices used for sound production like oscillators, pulse generator, Anzeigeverstärker [filter/amplifier] and band-pass filter (Kittler 1999: 96-97). Almost ten years later, rock musicians created sounds, techniques and aesthetics by following more or less the same path: misusing devices like the tape machine, which has its origins in German prototypes developed during the Second World War (Frith, Straw & Street 2001: 8), and experimenting with stereophony; something like what first pilots had experienced in their headphones years before, during the Battle of Britain:

> Long before the headphone adventures of rock'n'roll or original radio plays, Heinkel and Messerschmitt pilots entered the new age of soundspace. [...] The right transmitter beamed a continuous series of Morse dashes into the pilot's right headphone, while the left transmitter beamed an equally continuous series of Morse dots – aways exactly in between the dashes – into the left headphone. As a result, any deviation from the assigned course resulted in the most beautiful ping-pong stereophony (of the type that appeared on the first pop records but has since been discarded) (Kittler 1999: 100).

In a broader sense, Stockhausen and Schaeffer can be considered among the

8 With the word 'abuse' I want to point out the use of these devices in ways in which they were not intended.

first “rock artists” and similarly the rock musicians of the late 1960s as a younger generation of “electronic composers”. What they had in common was that they used these devices for compositional and musical processes.

In the field of popular music, even from the mid 1950's there was a shift from using the recording studio to capture a performance towards approaching it as a compositional tool (Toop 2001: 124-125; Cox & Warner 2008: 127-130) – just as, in the case of *musique concrète*, electroacoustic music transformed from a radio station to a laboratory in 1948 (Cook & Pople 2004: 343). These changes led to a multidimensional experimentation with the studio technologies and formed a recording industry that was less tied to the older puristic ideas of phonographic documentation (Toynbee 2000: 83).

The recording studio perhaps played the most decisive role in the growth and spread of rock music. The creative possibilities that rock musicians had in the late 1960s and early 1970s were almost unlimited: multitrack recording, multiple takes until the desired, “effects” could be achieved, and experimenting with recording techniques and the location of microphones and the performers. However, what we need to address here is that all of these possibilities emerged out of experiments with technology at an earlier stage, before the advent of rock music. With the introduction of the magnetic tape in studios, rock'n'roll and blues artists started to create “illusions” by using technology.

In the early 1950s, the guitarist Les Paul experimented with sound-on-sound techniques by overdubbing multiple takes utilising two tape machines, today known as “bouncing” (Toynbee 2000: 82) – thus creating a virtual performance made out of his own recorded takes. Above all, in this initial stage, tape was frequently used to create the illusion of virtual *space* (the illusion of a virtual *time* had to wait until the 1960s rock and psychedelia). A heavily used technique to achieve this was the “slapback echo” (later known as tape delay) – a technique that had to do with taking advantage of the physical distance between the record and play heads of a tape machine, and

feeding the incoming signal to the record head which probably worked as a playback head as well. (Toynbee 2000: 85; Frith, Straw & Street 2001: 9). According to Toynbee, in Elvis Presley's "Mystery Train" (1955), we are not made to listen to a space that is familiar, like a concert hall or a bar, but instead to

> " a *fantastic* dimensionality where the Presley voice is prominent due to its relative volume, yet, according to reverberation cues, far off; while the trap drum, which we know to be a loud instrument, has a crisp, 'dry' sound suggesting closeness" (Toynbee 2000: 86).

Other virtual spaces could be created by utilising microphone placement, amplification, the ambience and the acoustic reverberation of a space. Early Muddy Waters recordings feature techniques that made the guitar sound louder than normal by blending "dry" sound from the amplifier, sound from the studio acoustics and "wet" signal taken from a bathroom used as a reverberation chamber (Palmer 1992: 20-21). What we must point out here is that during the 1950's there was a gradual shift of focus from the live performance to the "performance" that happens in the situation of a recording studio where the manipulation and construction of sound is the dominant aspect of music-making.

This shift solidified even more with the increasing creative use of multitrack recording in the 1960s. With the addition of more tracks, overdubbing and layering were used more extensively and became commonplace. Producer Phil Spector experimented with these techniques to create his famous "wall of sound" in the early 1960s. The main characteristics of this approach were the dense layering of sounds and the intentional leakage between the microphones while recording (Toynbee 2000: 87-88); resulting in a spectrally richer and dynamically louder sound. A key factor to achieve this result was the fact that he was mixing in mono. Summing all the sounds in one track created a denser sound as opposed to a stereo mix (which was not commonplace during that period) where sounds are spread in the space. In addition, with more tracks in use, mixing started to be approached

creatively to create virtual sonic images not possible to experience without the use of technology. For example, in “You've Lost That Lovin' Feelin'” by The Righteous Brothers, the isolated clean voice is made to sound in contrast with what happens in the background of the mix where all the instruments and backing vocals sound as one reverberating sonic mass, making it impossible to distinguish the sources clearly.

Besides the illusion of space, technology could also create a temporal illusion. Even as early as 1948 Les Paul would record and play at different speeds using acetate disks instead of tape, thus giving an otherworldly character to his guitar sounds. Examples of these double-speed recordings can be heard in the tracks “Lover” and “Brazil”, from the album *The New Sound* released in 1948 by Capitol Records (Les Paul Foundation 2019). However, these techniques were not welcomed by the industry because of, what Toynbee (2000: 81) calls, “phonographic conservatism” of the time. Another example of time manipulation appears in the early 1960s with the work of the producer Joe Meek – who together with Phil Spector can be said to have motivated artists and producers to make experimentation with technology into a creative act (Kealy 1979: 3-29). What is interesting about Meek's EP *I Hear a New World* (1960) is the adventurous manipulation of sounds where, besides heavy compression and overdubbing, he employs pitch transpositions, reverse playback and tape delay with feedback throughout the album. In the track “I Hear a New World” some of the vocal and instrumental overdubs are sped-up because they have been recorded at half speed. Interestingly, if one pays attention to the vocals, the way in which manipulation is applied to them in time, describes a production process. The vocal tracks are repeated three times; the first completely unedited, the second more “far away” in the mix with reverb applied on them and the third sped-up with even more reverb used this time. Additionally, in the beginning of “Magnetic Field” we can hear some *musique concrète* influences where fragments of sounds made by tapping a spring reverb are run through a tape delay feedback and then played

reversed to create a group of “sweeping” sonic materials (Cleveland 2014). What is also remarkable about Meek's work is that he was experimenting working with stereo where Spector's production was based in mono. All of these experiments, together with the parallel innovations in the field of electroacoustic music, seemed like the perfect reference point for the rock musicians who started to experiment with studio technology during the late 1960s and the period of psychedelia, sometimes in order to replicate the experience of perceiving time under the influence of hallucinogenic drugs and sometimes for purely artistic and musical reasons.

Consequently, as multitrack recording became more mature, the making of a music album could involve different spaces and musical events that were not real-time dependent. Sounds did not have to be produced simultaneously; a music track could be constructed from several sound events separate in time. Post-production could shape a musical result as easily as a real-time performance. Thus, technology became a prerequisite for music-making and recording production could be considered a creative act in which sounds could be amplified, modified in attack and decay, spliced, altered in speed, mixed with others, equalised, put into virtual spaces and so on, as a part of a compositional process. Moreover, from the late 1960s onwards it gradually became normal for musicians in the field of rock to take control of the production process as they became more and more comfortable in using studio technology (Frith, Straw & Street 2001: 11).

It is fair to say that rock musicians and producers of the late 1960s and early 1970s reached a level of control in manipulating sound that can be compared to the kind of control the electroacoustic composers already had in the 1950s. The developments in *musique concrète* and *elektronische Musik* changed the ways sound was organised in time and gave the possibility to create timbre combinations and rhythmical patterns that before could not be implemented. These steps created a different sonic world requiring new ways of listening and musical perception. As we will see, all of these changes

replaced the classic role of the musical performer with a more complex network of technology and media-driven performances.

3. Phonographic interlude

Before moving to the next chapters where some rock recordings are explored in terms of their production techniques and aesthetic applications of technology, it is important to point out some examples of music from the field of classical and jazz genres where technology played a crucial role in shaping the form and sound of the music and how it was perceived.

According to Toynbee (2000: 87) "before the 1950s the live concert was to a greater or lesser extent the site of the ideal performance; after that decade the locus shifted to recorded work". This of course was not only true for popular music. In recordings of classical repertoire, despite the fact that the producers' only concern was to simulate the "best" listening position in the concert hall, with the introduction of stereo technology came a point where editing and post-production became more of a standard procedure (Cook et al 2009: 85-88). For example, producing a stereo version of Richard Wagner's *Tristan und Isolde* in 1958, John Culshaw created a virtual space where the orchestra is placed wide in the stereo spectrum and the voices in front of the mix (Culshaw 1981: 156-157) – thus creating a "distortion" of an idealised sonic image.

Furthermore, we should not dismiss another heavily discussed example of sound manipulation in the field of classical music: the case of Canadian pianist Glenn Gould and his application of editing and recording techniques. Gould believed that when a performance of music takes place in a concert hall, the relationship between the audience and the music is less intimate and the listener focuses on the success or failure of the performer. Moreover, the listener has no control on the sonic outcome since the volume, timbre and spatial perspective are strongly depending on where each audience member is

seated. Seeing the conditions of the concert hall problematic and disempowering in terms of how the listener experiences the music, Gould turned to the possibilities of recording technology as a solution to this problem (Gould & Page 1984; Mauer 2010: 103).

In 1964 (almost three years before the Beatles decided to stop their live appearances and focus mainly on studio work) he took a rather radical decision and quit concert performances to pursuit a studio career as a recording artist. Gould saw recording as an art in itself, separate from live concerts, and experimented with the recording medium in a variety of ways. According to Juha Markus Mantere (2012: 17), Gould is considered as one of the pioneers of the radio documentary as a musical genre. In his work *The Idea of North* (1967) he used a technique he called "contrapuntal radio" where he applied the notion of counterpoint in the domain of recorded sound by layering recordings of human voice and environmental sounds in a contrapuntal manner (Mantere 2012: 17; Mauer 2010: 102) – making a "fugue" out of concrete sounds instead of notes. Barry Mauer points out that this approach of organising sound derived from the way he was experiencing everyday sounds: "[Gould] would listen to the television and the radio at the same time. [He was] able to imagine the sounds around him as part of an emerging composition" (Mauer 2010: 102).

Furthermore, Gould's fascination with recording technology is also exemplified by his experiments in post-production and editing, which were part of a process he called the "post-taping afterthought" (Gould & Page 1984: 339). As he points out: "[During this process] the functions of the performer and of the tape editor begin to overlap. The judgement of the performer no longer solely determines the musical result" (Gould & Page 1984: 339). For example, by placing four pairs of microphones in different positions around the piano during the recording of Sibelius' piano pieces, he was able to create his own spatial interpretation by playing with the perspective of the music during the mixing process – making an analogy with

the ability of the film director to create close-up or long shots (Mantere 2012 : 102; Mauer 2010: 102; Broesche 2016: 3). Additionally, another controversial approach to use the recording studio creatively was to welcome splicing techniques to create a montage of different takes from recorded performances. Explaining the editing procedure he followed for the 1956 recording of J. S. Bach's fugue in A minor from volume I of *The Well-Tempered Clavier* – where two different recorded takes in terms of phrasing and expression are combined to create the final result – Gould points out:

> It was obvious that the somewhat overbearing posture of take 6 was entirely suitable for the opening exposition as well as for the concluding statements of the fugue, while the more effervescent character of take 8 was a welcome relief in the episodic modulations with which the center portion of the fugue is concerned. And so two rudimentary splices were made, one which jumps from take 6 to take 8 in bar 14 and another which at the return to A minor returns as well to take 6 (Gould & Page 1984: 339).

Consequently, whereas for many music critics and performers the ideal recording of the piece should reflect as closely as possible the live performance, the ideal for Gould was to step away from live performance and construct his own musical interpretation by combining different recorded events with the help of technology.

This notion of "performing" the studio played a crucial role in transforming and shaping jazz as well as rock and classical music. As early as 1951, there are examples of recordings proving that jazz moved beyond the path of simulation and documentation of a performance to the construction of a recorded artefact. Pieces like Lennie Tristano's "Pastime" and "Ju-Ju" feature elements that could never be experienced in a live performance. Taking advantage of the multitrack technology and with the assistance of his engineer, Rudy Van Gelder, Tristano super-imposed recorded improvisations creating denser harmonies and rhythmical correlations and the illusion of two players soloing at the same time (Shim 2007: 82). Moreover, his album *Lennie Tristano* (1955), depicts even more experimentation with the recording medium; not seen before in the field of jazz. For example, in the track "Line

Up", the unfamiliar timbre and the percussive character of the piano line suggest that the original take was recorded with the rhythm section running at half speed and then the result played at normal speed – something that, according to Eunmi Shim (2007: 92), seems to be truth but never confessed or denied clearly by Tristano. Additionally, in "Turkish Mambo" Tristano super-imposed three layers of recorded ostinati, each one at different meter, creating a minimalistic loop-like sounding background over which he overdubbed an improvisation (Shim 2007: 90).

These experiments paved the way for more experimentation with the recording medium in jazz. By the late 1960s, jazz had expanded in many different directions and one of these was towards rock music. This fusion was exemplified by the attempt of Miles Davis to attract the young rock audience by introducing stylistic characteristics reminiscent of rock, more electric instruments and of course more creative use of the recording studio (Pople & Cook 2004: 413-414; Frith, Straw & Street 2001: 90-91). The albums *In a Silent Way* (1969) and *Bitches Brew* (1970), heavily cited for the extensive use of editing and post-production, are the most representative of Davis' stylistic shift.

In a Silent Way was the first step in Miles Davis's new approach to composing. Producer Teo Macero, who had been working with Davis from the 1950s, started to become more and more involved in the sound and structure of the music – something that can be compared to the influence George Martin had on the Beatles. The material for the album was recorded during a three-hour session on 18 February 1969, but the final musical result that made it to the album was a product of re-evaluation and editing of these recordings during the post-production process (Tingen 2001b; Svorinich 2015: 85-86). Macero and Davis were equally responsible for this. According to Macero, the material left after the assessment of the recordings didn't make enough music for an album: "We cut things down to 8 ½ minutes on one LP side, and 9 ½ on the other, and then he said to me, 'That's my record.' I said,

'Go to hell!' because it wasn't enough music for an album. So I ended up creating repeats to make it longer" (Tingen 2001b). One of these repeats is audible in "It's About That Time" where Macero uses a short excerpt from a Miles Davis solo at the end of the track to create a beginning by splicing it at the start of it. In that manner, Macero not only made the album longer but also affected the structure of the music. Consequently, the 38 minutes of music that made the album were carefully assembled out of less than 27 minutes of recorded unedited material (Tingen 2001b). Without doubt, *In a Silent Way* was a breakthrough album that opened the possibilities for more experimentation with the recording medium, something that happened in Miles Davis' next release, *Bitches Brew*.

What was briefly explored in *In a Silent Way,* expanded even more in *Bitches Brew*. Instead of recording in an one-day session, the new album took three days to record, between 19 and 21 August 1969. This happened because Miles Davis chose a more fragmented method to record during the sessions, He would give the players only a few written notation and some sketches of ideas and the rest would be based on conducting and assessing any musical ideas that would come in real time from the musicians (Tingen 2001a). Session drummer Jack DeJohnette points out that:

> The recording of Bitches Brew was a stream of creative musical energy. One thing was flowing into the next, and we were stopping and starting all the time, maybe to write a sketch out, and then go back to recording. The creative process was being documented on tape, with Miles directing the ensemble like a conductor an orchestra (Tingen 2001a).

This start-and-stop method of recording was probably initiated by Davis having in mind the post-production process – thus, he concentrated only on capturing the best moments, moods and textures for him which then would be put together to form the final tracks.

Undoubtedly, Teo Macero's role was very crucial in this process. The tape editing in *Bitches Brew* is much more complex and decisive compared to *In a Silent Way*. Macero didn't just glue together large recorded parts but intervened in the micro-structure of some sections, creating musical and

thematic material that was never played by the ensemble or intended by Davis. In the opening theme of "Pharaoh's Dance", for example, the characteristic start-and-stop structure is a result of repeating tape fragments containing thematic material. In addition, a "*musique concrète* moment" is created by Macero at 8:53 where a very short tape loop containing small phrases from percussion and keyboard is repeated five times – something that is hardly identifiable by an unsuspecting listener. Moreover, Miles Davis's trumpet sound was manipulated separately by applying amplification and "effects". A small microphone was attached to the horn of the trumpet to pick up direct sound, firstly to increase separation in the mix and secondly to be sent to an amplifier and picked up from there for further manipulation. Tape delay was also used to create the echo effect[9] that is heard on Davis' trumpet between 8:29 and 8:42, an effect commonly used in rock music, thus creating a moment with very dramatic musical tension and exemplifying Miles Davis's intention of sounding like a rock band. A similar approach in editing was also followed for the title track "Bitches Brew". New sections and themes were created during post-production just by repeating short or longer musical fragments. According to Enrico Meriln's analysis, for example, the groove section played by the bass and bass clarinet from 3:01 to 3:32 was actually constructed by carefully glueing together smaller recorded phrases. Similarly, a short fragment of a phrase during a Davis solo is repeated a few times between 10:36 and 10:52 creating tension and giving the illusion of Miles Davis actually playing these phrases repeatedly (Tingen 2001a).

It is important to point out that the two albums, *In a Silent Way* and *Bitches Brew,* proved that jazz music could use recording technology to "escape" from the realm of live documentation by approaching musical material as abstract sound without loosing its musical spontaneity. Consequently, in this section we saw how, during the late 1960s, it became

9 The effect was achieved with the "Teo-1" device, especially designed for Macero which was an Ampex tape machine customised to have multiple adjustable playback heads in order to create different delay times (Svorinich 2015: 252-253).

possible for jazz music to transform to the conditions of the recording studio and, under the influence of rock music, use technology to expand to many different directions.

-Chapter II-

Endless takes

1. The Beatles

The post-1966 era of the Beatles, heavily discussed (by fans, music critics and researchers), is characterised by one fact above all: the band's gradual move from appearing live to spending time in the recording studio. Enjoying an almost unlimited budget for studio time, they had the freedom (given by their previous success) to try almost everything they wanted, in addition to which their passion for studio experimentation opened many creative possibilities (Julien 2008: 3-4, Everett 1999:31). Beginning with *Revolver* (1966) the Beatles showed that they were desirous of a change in their music - Paul McCartney's aim was to "distort" everything,

> "[...] to change it from what it is, and see what it could be. To see the potential in it. To take a note and wreck the note and see what else there is in it, what a simple act of distorting it has caused...and superimpose on top, so you can't tell what it is anymore" (Ryan & Kehew 2006: 422).

One month before the start of the recording sessions of the album, John Lennon revealed where the inspiration for this new album had originated:

> "Paul and I are very keen on this electronic music. You make it clinking a couple of glasses together or with bleeps from the radio, then you loop the tape to repeat the noises at intervals. Some people build up whole symphonies from it...One thing's for sure – the next LP is going to be very different" (Ryan & Kehew 2006: 408).

In 1967, the year of *Sgt Pepper's Lonely Hearts Club Band,* all of these ideas became more concrete and clear. Abandoning public performances completely, the Beatles focused mainly on "performing" one instrument: the recording studio. Pushing technology to its limits, they were trying to change their sound almost in every track. According to their recording engineer Geoff Emerick, the band wanted to make every instrument sound unlike itself - "a piano shouldn't sound like a piano, a guitar shouldn't sound like a guitar"

(Ryan & Kehew 2006: 433).

In this section, attempting to investigate how the use of the recording studio shaped Beatles' particular sound and aesthetic we will focus on some production and recording techniques by analysing them. Certain examples from *Revolver* (1966), *Sgt Pepper's Lonely Hearts Club Band* (1967) and the *"White Album"* (1968) will be discussed.

Tape creativity: looping, reversing, splicing

The principal tool responsible for enriching the sonic vocabulary of the Beatles was the tape machine. Looping, reversing and editing tape were some of the techniques they rediscovered. These techniques were not new at the time, having been conceived almost two decades previously by composers in the field of electroacoustic music. In 1948, using lathe-cutting technology, Pierre Schaeffer created closed grooves on disc (rather than tape) which made the recorded sound loop endlessly (Maconie 2016:90). Paul McCartney was aware of the experiments of avant-garde composers and during 1966 attended concerts with music by Stockhausen, Berio and Cage (Everett 1999:32, Stiefel 2016). Drawing from his influences at the time, he was the first of the Beatles who started experimenting with tape loops using his tape recorders at home. What he would often do was to record on a loop that was placed in a tape machine which had its erase head removed. Recording on a loop with this setup resulted in creating layers of superimposed sound that saturated the tape and created a mass of sound as time passed by (Ryan & Kehew 2006: 304).

These experiments fascinated McCartney and all members of the group quickly followed in utilising such techniques. "Tomorrow Never Knows" from *Revolver* was the first track that featured tape loops heavily. During the recording sessions, five tape loops were running on five different tape machines, all of which were connected directly to the console where their output could be adjusted in the mix. Another characteristic example of tape

loop usage is the track "Revolution #9" from the *"White Album"*. Lennon, Harrison and Ono created this sound collage by using looped material from EMI's tape library. This material included recordings from testing tapes (where the famous "number-nine" loop comes from), orchestras, radio broadcast, football chants and many other sources (Ryan & Kehew 2006: 304-305; Everett 1999: 174-175). The sound-world of "Revolution #9" can be strikingly compared to the radio-like character of Stockhausen's piece *Hymnen* (1966-1967). Writing about the "shortwave chaos" of *Hymnen,* Robin Maconie (2016:246-247) makes an interesting parallel with the simultaneously sounding events that happen when one is trying to tune through radio stations. The two pieces share a fair amount of similarities in terms of the material used like the intonation of the number nine[10], the use of crowd sounds, recordings of orchestral music manipulated in speed, speech, and found sounds. The way the material is organised and mixed in both examples creates moments where the sound events can be clearly followed and distinguished and other moments where the material is manipulated and densely combined in such a way that it is perceived as a sound mass, making it impossible to detect the origin of each sonic event. Furthermore, besides *Hymnen* , we can also detect similarities with the third movement of Luciano Berio's *Sinfonia*. According to Andrew Stiefel (2016), the way in which Berio creates a collage of instrumental and vocal quotations using the orchestra and eight amplified voices, resembles the character of "Revolution #9". Berio points out that his piece "must be understood in its etymological sense of 'sounding together' of eight voices and instruments or, in a larger sense, of 'sounding together' of different things, situations and meanings"[11] - a very similar approach to that found in *Hymnen* and "Revolution #9".

Additionally, another technique fished out from the field of

10 In *Hymnen*, at 7:50, Stockhausen is heard to pronounce the words "the nine" in a very similar manner to that of Revolution #9.

11 Berio cited in Stiefel (2016). Retrieved from www.seattlesymphony.org. Available at: https://www.seattlesymphony.org/watch-listen/beyondthestage/beriobeatles1968 [Accessed 25 Nov. 2018].

electroacoustic music was backwards tape playback. The Beatles discovered it accidentally when John Lennon played the tape from the wrong side on his tape machine. The band were amazed by how it sounded, and experimented with the technique in different ways. In the track "Rain", backward recording was applied to vocal parts (2:35) by taking a sample from a different part of the track, copying it onto another tape machine and then recording it backwards to the desired section. In "I'm Only Sleeping" George Harrison recorded two takes of the same guitar solo superimposed while the tape machine was running in reverse – so when the recording played in normal order the solo would sound backwards. In "Blue Jay Way" another interesting method was applied by fading in and out a reversed version of the whole track during the song. More examples of this technique can be traced in "Tomorrow Never Knows" and "Revolution #9" where some of the tape-loops are played backwards (Ryan & Kehew 2006: 302-304). Moreover, another example that connects the Beatles to electroacoustic music is the way *Sgt Pepper* ends, which is often ignored as a gimmick. After the orchestral crescendo of the track "A Day In The Life", following a 15 kHz tone (which was supposed to be heard by dogs according to Lennon), a loop was recorded in the inner "run-out" groove of the vinyl which played endlessly until the stylus of the turntable is raised. Here we see a direct connection with the "sillon fermé" or closed groove experiments of Pierre Schaeffer in the early days of *musique concrète* as mentioned above.

Furthermore, another aspect of approaching the tape machines in a creative manner was editing or splicing. The recording and production process of "Strawberry Fields Forever" was not an ordinary one and involved a very unusual method of editing. Two versions of the track were made – one in a slow tempo and in the key of A major and one in a faster tempo in the key of C major with overdubbed strings and brass. The Beatles preferred the second faster version of the song, but John Lennon thought that the beginning of the first slower version was also good and wanted to combine the two versions. In

order for the two takes to be spliced together, George Martin had to speed up the first slow version and slow down the second faster version until they matched in tempo and pitch, so that the two mixes could be spliced together at a spot considered suitable. However, if we listen carefully the edit can be heard at 0:59 when the word "going" appears in the lyrics (Ryan & Kehew 2006: 438-439, Everett 1999:78-79). This edit resulted in a slight difference of tempo and "feel" as well as in timbral characteristics between the two takes. As Olivier Julien puts it, the process of making "Strawberry Fields Forever" was a very crucial one:

> Beyond technical prowess, the determination of the overall sound and structure of 'Strawberry Fields Forever' by this manipulation of the phonographic medium clearly shows that by the time they had completed that song, the Beatles were no longer concerned with the performability of their music (Julien 2008:6).

What can be added here is that this notion of splicing together segments recorded at different pitches and tempi can be compared to the second movement of Parmegiani's *De Natura Sonorum* (1975) where many different sounds are transposed upwards or downwards to the same pitch, and then spliced together one after another to create collage-like forms and sequences. Additionally, by comparing the two cases, we can notice that the exact same tool (varispeed control) is used to achieve completely different musical results. In the case of "Strawberry Fields Forever", pitch transposition and splicing are used for editing purposes, in favour of a recorded performance, whereas in the case of *De Natura Sonorum*, the technique becomes a tool for composition and plays a significant role in forming the music.

Artificial double tracking, flanging/phasing, masking

One of the most well known and commonly used of the Beatles techniques was artificial double tracking (ADT). From early on, the group considered double-tracking vocals a standard technique to make their sound more rich and prominent. This was done by singing each vocal line twice, trying to make

the second take almost identical to the first one and then combining the two recordings. However, this procedure was very time-consuming, and this led EMI engineer Ken Townsend to come up with an idea to achieve almost the same sounding result artificially. ADT was based on the principle of creating a duplication of an existing recording and then placing this exact copy before or ahead the original signal in time. This would give the impression of the two separate signals playing almost in synchrony, which would be very reminiscent of manually double-tracked signals. Technically, the key element that allowed the creation of ADT was the fact that the record head of the tape machine also served as a playback head and had a separate dedicated amplifier. Thus, the signal passing through the record head of J37 could be send to a second tape machine running at the double speed with the distance between its record head and playback head double that of the J37. Consequently, the delayed signal could be heard almost simultaneously with the original signal. The unique characteristic of this technique lies in the fact that by using the varispeed control to alter the speed of the second tape machine the delayed signal could be then shifted to sound slightly before the original signal (Ryan & Kehew 2006: 294-297). The Beatles used ADT mostly for vocals and examples of it can be heard in the tracks "Eleanor Rigby" at 0:31 and "A Day in The Life" at 0:24.

In addition, further interesting techniques emerged from using ADT: flanging and phasing. Placing two identical copies of a sound very close to each other in time resulted in frequency cancelations and additions, also known as comb-filtering. However, *flanging* was achieved by continuously changing the delay time of one tape machine, resulting in the two signals moving in and out of phase and thus to a filtering effect moving up and down through the frequency spectrum. With the same exact setup and a slight change in the process the effect of *phasing* could be achieved – by phase reversing the delayed signal resulting in total cancelations of some frequencies. The most characteristic examples of these techniques can be

heard in the mono mix of "Lucy In The Sky With Diamonds" in all the vocal tracks throughout the song. Examples of flanging and phasing are clearer in mono mixes, because of the better summation of the sounds when being projected from the same place – as opposed to a stereo mix, where the delayed signal can be placed in a different place in the stereo spectrum resulting in attenuation of these frequency-cancellation effects (Ryan & Kehew 2006: 298-299).

Masking is another of the side-effects when mixing in mono. Masking happens when a sound, or some component of a sound, is rendered inaudible because of the spectral qualities of another sound which is occurring simultaneously. In a mono mix, all sounds are mixed together in one track, so it is possible to perceive a lower-amplitude frequency "masked out" from a higher-amplitude frequency if both frequencies belong more or less to the same range (Moylan 2007:33). This phenomenon can be traced in the Beatles' track "I'm Only Sleeping" (*Revolver*) where it is possible that the acoustic guitar gets masked by the drums and bass and this could have to do with the mono mix. Stereo mixes were often thought as an annoyance by engineers in the 60s, although, from the second half of 1965, they were gradually becoming accustomed to the fact that stereo pop albums would become dominant (Ryan & Kehew 2006: 402). In most of the *Rubber Soul*'s and other early Beatles albums stereo mixes the instrumental tracks were panned hard left with the vocal tracks panned hard right; resulting in a "hole" in the middle of the stereo image. According to George Martin, these kind of mixes were designed this way in order to achieve a "mono result" from a stereo record – having in mind that most domestic record players had built-in speakers very close to each other and thus resulting in a very narrow stereo image that sounds very close to mono (Ryan & Kehew 2006: 402,404). Nevertheless, even during the mixing of *Revolver* (1966), the standard procedure was still to mix in mono with the Beatles actively participating in the mixing process. Stereo mixes were left to Emerick and Martin since the Beatles themselves were showing

little interest in them. *"Sgt Pepper"* (1967) took three weeks to mix in mono - according to Emerick this is the best version of the album because all the creative effort was made while monitoring in mono (Ryan & Kehew 2006: 428,462).

Varispeed

What the EMI staff of the 1960s called "Frequency Control", also known as "varispeed" was the ability to control the speed of the capstan motor of a tape machine and as a result its playback speed. This was done by connecting an audio oscillator to a power amplifier that then controlled the speed of the motor. The Beatles sensed the artistic possibilities of varying the tape speed and recording at any speed they liked, and used this technique extensively to enrich their palette of sounds from 1966 onwards. When a sound is played at a different speed than that at which it was recorded, the texture of it is altered as well; the attack, sustain, decay and pitch are shifted and new timbres are created (Ryan & Kehew 2006: 289-292).

The Beatles applied this technique to many tracks. One example is the song "Rain" which was released as the B-side for the single "Paperback Writer" (1966). During the recording sessions of the song, the guitar and drums were performed faster than the intended final tempo. Then the tape machine playback speed was slowed down slightly so that the drums and guitar sound "thicker" and "deeper"; the same technique was applied as well to the rhythm track of "I'm Only Sleeping" (Ryan & Kehew 2006: 419). The opposite procedure was followed for the vocal tracks. John Lennon recorded his vocals at a tape machine running slightly slower so when the recording was played at normal speed the vocals would sound some semi-tones higher, thus very different in timbre. The group preferred to record at slower speeds and then play the tape machine faster than performing faster and play the tape machine slower; mainly because playing something faster maintains the clarity and sharpens the attack of the sound. The varispeed technique was also

heavily used in the recording sessions of *Sgt Pepper*. In the track “Lucy In the Sky With Diamonds” three individual vocal overdubs were recorded at three different speeds and later combined and played back together in tune. In addition, whole tracks (Within You Without You”, “When I'm Sixty-Four” and “She's Leaving Home”) were also pitched up during the final mix to make them sound more “up tempo” or “alive” (Ryan & Kehew 2006: 292-294).

Recording techniques

From 1966 onwards, the way the Beatles and their sound engineers were approaching recording techniques played a very important role in shaping their distinctive sound. Close-miking was one of these techniques. Discussing the differences in recording practice between US and UK, Frith and Zagorski-Thomas (2012:67-70) point out that it was a less common phenomenon to close-mike in the UK because of the more institutional and conservative character of the studios (as opposed to the commercially driven and entrepreneurial smaller independent studios in the US) during the late 60s and early 70s. This probably happened because the smaller commercially driven studios could move faster to productions with more artificially made separation whereas the bigger institutional studios could not easily leave behind the more “natural-sounding” production. However, this changed as the years passed. During the *Revolver* sessions, Emerick started experimenting with close-miking techniques to capture Ringo's bass drum, even though he had to ask permission from the studio management being the newest and youngest engineer. The microphone positioning, in combination with the deadening of the drum by putting cloths inside to reduce resonances, resulted in a more “tight” bass drum sound (Everett 1999:34, Ryan & Kehew 2006: 411,414). Besides drums, close-miking was also used for recording the double string quartet on “Eleanor Rigby”. McCartney wanted the strings to play without vibrato and the chords with a “bite”, and in order to amplify this particular way of playing, Emerick experimented with the positioning of the

microphones:

> No one had heard strings recorded that way before, the sound of the bow on the string. That was the first time that I started mic'ing the strings real close. Usually [the microphones] were placed [away] from the players; that was normal technique. What I did was place the mics – these small condenser mics – right up near the f-holes (Ryan & Kehew 2006: 422).

Moreover, another very interesting and rather unusual technique was applied to record the bass. McCartney was always jealous of the stronger bass sound he heard on American records, and asked the engineers if they could achieve something similar. Consequently, Townsend and Emerick came out with the idea of using an EMI loudspeaker as a microphone. The so-called "White Elephant" speaker was connected directly to the mixing console and with that setup they recorded the bass. This experimental way of recording resulted in a very convincing and strong bass sound, but gave rise also to extra unwanted upper frequency noise. For that reason, this technique was only used in the tracks "Paperback Writer" and "Rain" and then abandoned (Guesdon and Margotin 2013:669, Ryan & Kehew 2006: 420-421).

Furthermore, the Beatles urge to find new timbres by "distorting" every familiar sound led them to continuously seek ways to misuse the tools available at the time. Feeding non-organ sources through a Leslie speaker and recording the outcome was another way of achieving this aim. The normal use of a Leslie speaker was with the Hammond organ and resulted in the signature "rotating" sound – however, with a modification by the EMI engineers, any sound source could be fed into the speaker and picked up using a microphone. The most extensive use of the Leslie speaker can be traced on Lennon's vocals in "Tomorrow Never Knows" where he requested that he wanted to sound like the "Dalai Lama". The Beatles were excited by the results of the technique and continued to use it on guitar and piano tracks as well (Guesdon & Margotin 2013: 660, Ryan & Kehew 2006: 423-426).

Although the mechanism of a Leslie speaker did not include actual rotating speakers inside the cabinet, but a rotating sound baffle and a horn-shaped device around the bass speaker and the treble speaker respectively

(Ryan & Kehew 2006: 316), we can see some sort of conceptual connection with the rotating speaker that Stockhausen used in *Kontakte*. In search of a more rapid movement of sounds, than just gradual shifts from speaker to speaker using potentiometers, Stockhausen made a rotating speaker which enabled him to project sound layers in a circular pattern around the four loudspeakers. A speaker enclosed in a tube-shaped baffle was mounted on an old rotating table. As the speaker rotated, its sound was picked up by four microphones placed at the four points of a square and facing the center. Each microphone was routed to a separate channel of a four-track tape recorder so that the recorded sound could be projected through a four-loudspeaker setup. Stockhausen himself was very fond of the varying phasing effect that the manually rotated sound produced which as he mentioned, could not be achieved just by panning a sound from channel to channel (Maconie 2016: 188-189). Arguably, going back to the Beatles' experiment, we could think this exact phasing effect of Stockhausen's rotating speaker as a connecting thread to the characteristics that make the rotating sound of a Leslie speaker unique.

Microphones

The kinds of microphones used by the Beatles to record their albums played an equally important role to the creation of their characteristic sound. Developed by Neumann in the late 40s, the U 47 has become one of the most respected vocal microphones in history. It was the first switchable pattern condenser microphone and produced either a cardioid or omnidirectional pickup pattern. However, Abbey Road studios had some very special “hybrid” Neumann 47/48s which combined the pickup patterns of the U 47 and those of the U 48 so that a figure-of-eight pickup pattern could be also chosen. This meant that the Beatles could record two vocals at the same time with two members of the band facing each other and singing into one microphone. The figure-of-eight pattern allowed recording vocals with a minimum amount of leakage, since the Neumann 47/48 rejected sound from the sides. This was

crucial because during their early recording sessions the Beatles monitored the backing tracks not through headphones but from a speaker placed in the room where the recording was taking place (Ryan & Kehew 2006: 168).

Certain microphones were also used to record sound sources that they weren't intended for. An example of this is the Neumann KM 53 mic which was used by Ken Townsend to record the "underwater" vocal sound for the track "Yellow Submarine" (1:32) by wrapping it in a plastic bag and submerging it in a milk bottle (Ryan & Kehew 2006: 172). Another example of using a microphone to record a sound source it was not intended for was the use of the ribbon STC 4033-A for the kick drum – despite the fact that it was a fragile and SPL[12]-sensitive microphone. The main reason leading the Abbey Road engineers to use this microphone for the bass drum was probably its cardioid pattern and the low end boost caused by the proximity effect[13]. To avoid the direct sound pressure coming from the drum, Norman Smith often placed the microphone higher and pointing to one side, or lower and pointing upward.

Consequently, we could argue that from the point that musicians and producers started to experiment with all of these types of microphones and their uses, the decision to choose the "right" microphone transformed from a merely technical decision to an aesthetic one which has musical value. Depending on how one uses it, the microphone reveals or rejects certain sonic characteristics that could eventually shape the music. Certain frequencies and the amount of noise in the signal are boosted or deadened, and the spatial representation of the source is also affected (Zagorski-Thomas 2014: 55). Microphones are essential tools and play a vital role in the production process as they can be considered the "ears" of the sound engineer/producer. In that sense, the mixing process of a recording production, actually starts during the microphone placement where the distance between the source and the

12 SPL stands for sound pressure level which is measured in dB.

13 A phenomenon where the lower frequencies are emphasised as the microphone moves closer to the sound source.

microphone that picks up the sound is decided. As Paul Théberge points out, although the function of microphones has become completely “naturalised” and “invisible” to us, their impact should not be underestimated since they are still the starting point for every recording production even in the digital age (Frith et al 2001: 4).

In this chapter we highlighted some of the production techniques that the Beatles used during the late 1960s and explained how they came out from experimenting and approaching creatively the available technology of the time. The originality of their production served as a guide for experimentation in the context of popular music and soon many other rock artists would follow the same path.

-Chapter III-

Improvised takes

1. Pink Floyd: Early experiments

With the release of *Revolver* (1966) and *Sgt Pepper's Lonely Hearts Club Band* (1967), the Beatles proved that the emerging rock idiom (later known as "progressive rock") could be approached as an empty frame where a fusion of different music styles could take place. As mentioned in the previous chapter, this merging of styles was strongly facilitated with the use of studio technology. The Beatles paved the way for studio experimentation (at least in Europe), and very soon other rock bands followed them. Without necessarily imitating the Beatles, other rock artists saw the possibility of using the recording studio to experiment and create their own characteristic sound. In this part we will focus on how the spontaneous and improvisatory approach to playing music led Pink Floyd to use the recording studio in this kind of way, especially during the production of *Ummagumma* (1969) and analyse some of the techniques used. Furthermore, drawing information from a short e-mail correspondence with Fred Frith – multi-instrumentalist, composer, improviser and founding member of the English rock group Henry Cow – regarding his personal experience with recording technology and production techniques, we comment on different aspects of "studio improvisation" and its artistic and musical output.

While Pink Floyd were working on their first album, *The Piper At The Gates Of Dawn*, at Abbey Road in 1967, the Beatles were recording *"Sgt Pepper"* in Studio 2. According to Peter Jenner, Pink Floyd's manager at the time, "[...] The Beatles were copying what we were doing just as we were copying what we were hearing down the corridor!" [14]. Pink Floyd even visited

14 Retrieved from http://www.sydbarrett.net/subpages/articles/wish_you_were_here_mojo.htm (accessed on

The Beatles during the mixing process of “Lovely Rita” in Studio 2 and received flattering comments for their work from Paul McCartney[15]. Besides the fact that the two bands were sharing studio facilities and technicians, there were many differences between their approaches to recording and production. The Beatles' more careful and systematic approach contrasted with the more intuitive way Pink Floyd were using the studio during their early years. With Syd Barrett as a songwriter and band leader, it was more natural for Pink Floyd to take a path of sound exploration and improvisation.

Keith Rowe, guitarist of the free improvisation group AMM, discussing the importance of art schools noted that “Substantial British musicians experimenting and breaking through the old barrier came from art schools, went to art schools or were in art-schools circles. The Pink Floyd is a classic example”[16]. Barrett studied at Cambridgeshire College of Arts and Technology. Besides painting, he was exposed at this time to the free jazz of John Coltrane and Charles Mingus and to the American Beat literature of William Burroughs. Drawing inspiration from John Cage and David Tudor's prepared piano on *Indeterminacy,* he moved away from playing riffs or blues solo in favour of rolling marbles on his guitar strings and experimenting with feedback (Palacios 2010, 40-52). When Pink Floyd started playing at “Spontaneous Underground” (a venue for psychedelic music in London) they entered the heart of the underground London scene – a much more suitable place to play their music compared to art-school dances. There, Barrett came across the free improvisation ensemble AMM. Seeing Keith Rowe approaching his untuned guitar as a sound-making tool instead of playing chords, and using everyday objects to interact with the strings proved to be a very important moment for Syd Barrett. He immediately made connections between what he heard on Coltrane and Cage albums, his own improvisations and Keith Rowe's technique (Palacios 2010: 100-101).

January 17, 2019).

15 Ibid.

16 Cited in Palacios (2010: 61).

AMM's music was focused mainly on creating a spontaneous collision of sound layers rather than a rhythm or a song. Heavily influenced by this approach, Barrett implemented their spontaneity in his guitar-playing and songwriting, consequently creating a characteristic sound for Pink Floyd. During the recording sessions of Pink Floyd's first album, *The Piper At The Gates Of Dawn* (1967), Barrett followed a spontaneous "first-take, best-take" approach and was not particularly interested in the technical details of the production process. This job was left to Norman Smith and Peter Bown. Smith was the producer of the band and, working closely with George Martin and the Beatles, he had developed skills in structuring harmony, and experience with working on edits. Peter Bown was an open-minded balance engineer who welcomed Floyd's experimentation and according to Kevin Ryan "[...] he was by far the most innovative and experimental engineer at EMI studios" (Palacios 2010: 180).

Smith and Bown had to adapt to Barrett's unpredictability and addiction to drugs, and this played a vital role in shaping the sound of *Piper*. Since Barrett derived no pleasure from the recording process, Norman Smith could only help the band by understanding their intention and think of sounds to improve a statement or mood (Palacios 2010: 184). Barrett's improvisational and spontaneous character is immediately recognisable in his guitar playing and the band's long jams and sound explorations – however it is not evident in the way the band was experimenting in the studio.

The mono mix of the album comprises a few treatments and moments which reveal studio experimentation. Despite the fact that the band was playing very loudly, the engineers did not use many audio screens in Pink Floyd's sessions to minimise audio "bleed", except with the bass amplifier and vocals, where Barrett was placed in a vocal isolation booth wearing headphones to make the best use of his quiet voice (Palacios 2010: 182). This kind of treatment resulted in a mix where Barrett's soft vocals sound at a similar level to the rest of the band. This otherworldly element is easy

recognisable in the vocals of the track “Astronomy Domine” at 0:48. The absence of audio screens resulted in a more “roomy” production throughout the album. In addition, more artificial reverb was added using the studios chambers or the EMT plate reverb, forming a significant influence on the album's sound (Palacios 2010: 183). Moreover, the combination of an experimental EMI Zener limiter with a Fairchild compressor gave slight mid-range distortion (Palacios 2010: 182) which is particularly noticeable in the tracks “Flaming” and “Bike”. ADT, which had been invented during the Beatles' recording sessions (as we saw in the previous chapter), was also frequently used on both vocals and instruments, adding phasing effects and depth especially in mono mixes. Phasing is much more prominent on “Flaming”, mostly noticeable on the drums, and “Matilda Mother” on the vocals. On this album, the studio techniques did not actually play a leading role in creating the band's sound, but worked more as an “accompaniment” which highlighted certain aspects of the album.

On the other hand, it is important to point out that, despite the band's lack of experimentation using the studio facilities during that period, their live appearances were far more adventurous. Since late 1966, Pink Floyd had been using light shows in combination with extended improvisational music for their multimedia concerts. Their Queen Elizabeth Hall concert, named “Games for May”, on 12 May 1967 was a case in point. Besides the band's complex usage of light projection, this was the first rock concert (in Britain) to feature quadraphonic sound. Rick Wright used a panning control device called “Azimuth Co-ordinator” – made by Bernard Speight, an Abbey Road technician – to control the spatialisation of his keyboard sound around the four corners of the hall (Greene 2016: 158; Chapman 2011: 160; "Revisiting Pink Floyd's iconic Games For May" 2018). Moreover, Roger Waters, Wright and Barrett prepared short tape pieces to be played before and after the concert. Waters' contribution was a sound collage of “bird” sounds meant to be played as the audience entered the hall. Roger Waters:

> For Games For May I also made "bird" noises recorded on the old Ferrograph at half-speed, to be played in the theatre's foyer as the audience was coming in. I was always interested in the possibilities of rock 'n' roll, how to fill the space between the audience and the idea with more than just guitars and vocals[17]

One can easily make a connection here with the attempt of Le Corbusier and Varése to *surround* the audience with light and sound projections in their *Poéme Électronique* for the Philips pavilion at 1958 Brussels World's Fair[18]. Interestingly, Iannis Xenakis' musical contribution to the occasion, *Interlude sonore*, functioned as the intermission music which would be played as the audience would enter and leave the pavilion (Tazelaar 2013: 153-157) – a very clear parallel to how Waters' tape piece was used in "Games for May".

For their second release, *A Saucerful of Secrets* (1968), the band followed more or less the same path. With Syd Barrett less cooperative, the band called in David Gilmour to join them and gradually replace Barrett. In this transitional phase, Pink Floyd started focusing more on longer improvisations and jams in search of a playing style to build upon Barrett's experimentation. This is evident in the longest (almost 12 minutes) piece on the album, the title-track, which is the only example of Barrett's spontaneity "leaking" into the ways the rest of the band members treated studio technology: creating a collage of sounds by combining layers of recorded guitar feedback, inside-piano playing, tape loops and reversed samples.

Pink Floyd's next album was probably the most daring for a band that was becoming more and more famous but wanted to stay loyal to their vision. *Ummagumma* was an album that would polarise their fans and the pop music community. As we will see in the next section, one year after Syd Barrett's leaving, Pink Floyd chose the path of experimentation to find a direction for their sound - which until then had only been Barrett's concern.

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17 Taken from Steve Hoffman Music Forums. "Pink Floyd - Games For May (1967)". 2017. Steve Hoffman Music Forums. https://forums.stevehoffman.tv/threads/pink-floyd-games-for-may-1967.670652/. (Accessed on 23 Feb 2019).

18 For a more thorough analysis of the Philips pavilion concept and music please see Kees Tazelaar's book *On The Threshold Of Beauty* (2013).

Ummagumma: a spontaneous experiment

The double album *Ummagumma* (1969) consists half of recordings made in the studio and half of live recordings. The two albums give us an accurate idea of what the band was doing in 1969. The first contained tracks from two recorded live shows which took place in the Manchester College of Commerce and Mother's Club in Birmingham. The live album comprises alternative versions of tracks from previous albums which are characteristic of how the band could jam to create different kinds of musical "moods". "Astronomy Domine" sounds more powerful in terms of volume but is lacking the extra layer of perception that the production gives in its studio counterpart. The live version of "Careful With That Axe, Eugene" seems to fit better the track's character – a modal rock jam that builds up a climax and fades out. In the last two tracks, "Set The Controls For The Heart of The Sun" and "A Saucerful of Secrets", the band finds more space for improvisation, thus creating new sounds and material which do not feature in the studio versions.

However, we will concentrate here on the studio album for various reasons. It marks a transitional phase for the band during which they sought to find their musical character after Barrett's departure. This led the band to experiment with a more "free-form" approach on many levels. The concept of the studio album was that each member would go in the studio and express themselves individually, without thinking about the overall unity. Nothing was pre-decided or discussed beforehand. Mark Blake (2008) points out that the album was not a concerted step forward for the band and that their solo compositions did not work well. In later interviews, the same opinion was supported by the band members themselves, with Wright describing his track "Sysyphus" as "pretentious", and Waters regretting his decision to put each member to work separately on solo compositions (Blake 2008: 135-136). However, other criticisms of the album highlight its importance for the band's subsequent success story. Ed Howard wrote in *Stylusmagazine.com*[19] that

19 The website is not active anymore, the information was retrieved on February 7, 2014.

Ummagumma was the record in which Pink Floyd was not afraid to do anything, and that the chances of changing direction altogether over that period were infinite. The musical and sonic ideas developed on the album resembled an experiment that would bring back the sense of creativity to the members of the band (Stylusmagazine.com 2003). "What all the pieces had in common was a section where each Pink Floyd member sounds as if they've been left to fool around in the studio unsupervised" (Blake 2008: 136).

Without doubt, the studio component of *Ummagumma* reveals the band's gradually increasing involvement with the production process, recording techniques and the technological means of a studio to influence their creative output (Guesdon and Margotin 2017). One of the first impressions upon listening to the album is that instruments are used in unorthodox ways, and given different functions with the studio technology playing the most crucial role in this process.

Wright's four-part piece "Sysyphus" opens the album and comprises a very interesting variety of timbres and contrasts. In the first part, layers of Mellotron[20] are overdubbed to create a more "symphonic" sound in combination with the timpani. The second part is actually a recording of a piano improvisation where Wright gradually moves from tonal material played on the middle/high register of the piano to atonal material played on the low register. The third part is where the studio techniques play a crucial role and in fact shape the music. Two different recorded takes with material from the inside of a piano, a snare drum and a cymbal are combined and hard-panned left and right in the stereo field. In this way, combining rhythmically unrelated materials resulted in rhythmic correlations between the two takes which would not be possible to achieve by other means. Additionally, tape loops of recorded train sounds (0:12, 0:38) and sped-up vocalisations (0:22, 0:46) are faded in and out of the mix. This material moves between the two

20 The Mellotron is a polyphonic tape replay keyboard originally developed and built in England, in 1963. Please see https://en.wikipedia.org/wiki/Mellotron (accessed on 19 October 2019).

speakers and sounds more reverberant and "wet" in the mix in contrast to the more "dry" hard-panned percussive sounds. The main characteristic of the fourth and last part of Wright's piece is how sparse or dense layers of mostly slowly evolving dissonant material are formed by combining recorded improvisations with a variety of instruments, environmental and tape-manipulated sounds. Moreover, something interesting here is an extra layer of spatial perception. Between 1:00 and 3:06 a group of sounds (detuning a guitar, bird and water sounds) are made to move gradually around the stereo spectrum and against a group of other more stable sounds (organ, mellotron, vibraphone) – thus creating a slowly evolving soundscape[21].

This approach could be seen as a simplified analogy to what happens on Xenakis' *musique concrète* piece *Bohor* (1962). Investigating Xenakis' first electroacoustic pieces, Gibson and Solomos (2013) point out that the most interesting feature of *Bohor* is that the material was created by following an improvisatory approach. Sketches, made by Xenakis himself in the 1980s after listening to the piece again, reveal information about the spatial distribution of the channels (quadruple stereophony), dynamics and the kinds of sounds used (Laotian mouth organ, inside-piano, pieces of jewellery, bells, metal sheet). What is also revealed from Xenakis' archive is that he performed and recorded all the sounds himself, and that the only manipulation he applied was filtering, reverberation and speed alteration – a kind of workflow that is typical of those followed by a rock producer/musician in the 1960s. It also seems that, given the relative lack of manipulation applied to the recorded materials, musical decisions like timbral contrasts or spatialisation had to be taken while improvising in real-time, while recording and mixing (Gibson and Solomos 2013). When listening to *Bohor* one has the feeling of a "performance" and "liveness" while at the same time one experiences a constant and gradual movement of sounds in space – something very similar to the "sound world" created in Wright's fourth part of "Sysyphus".

21 The position and movement of sounds are better perceived when using headphones.

Another point of interest in *Ummagumma* is the production in Roger Waters' pieces “Grantchester Meadows” and “Several Species of Small Furry Animals Gathered Together in a Cave and Grooving with a Pict”. “Grantchester Meadows” is an example of how recording technologies and amplification can make normally weak and soft sounds stand out and play a leading role. The piece fades in with a loop of bird song sounds and a recording of a fly moving around the stereo image. Waters' very softly played acoustic guitar and almost whispering voice are amplified and brought up gradually in the mix to reach almost the same volume level as the bird and fly sounds. We could say here that we experience a “proto-ambient” approach in the mixing process, where environmental sounds are not just a mere accompaniment but enjoy almost the same attention as the rest of the material. In the late 1970s, Brian Eno spoke of an "ambient" listening, where music would be a tint inside a more general sound environment. He also stressed that ambient music should be capable of providing "many levels of listening attention without enforcing one in particular; it must be as ignorable as it is interesting" (Cox & Warner 2004: 94-97). It is important to add here that ambient music in the current period is one of the areas in which the boundary between popular and experimental music is most fluid, since the genre comprises on the one hand composers like Monty Adkins or François Bonnet (Kassel Jaeger) and on the other hand EDM artists like Aphex Twin.

In Waters' second track “Several Species [...]”, techniques such as overdubbing, reverb, tape looping and playback speed alteration are the main elements of the music. The recorded material used for the piece was not produced by any instrument – Waters used only his body to create sounds by tapping or blowing a microphone or imitating “animal” sounds using his voice. By speeding up the material and combining many layers of overdubbed takes and loops, he creates a variety of textures and dense polyrhythms which fade in and out of the mix. Waters's inspiration for this piece seems to derive from his collaboration with his friend and experimental composer/performer

Ron Geesin, with whom he worked on the music for the documentary film *The Body,* releasing it on the album *Music from The Body* in 1970 (Geesin 2019; Breznikar 2016). On some of its tracks we can trace similarities with Waters's piece regarding material and production techniques. For example, in "Our Song", body-generated material is sped up and cut into small fragments which are then spliced together to create a collage which acts as arhythmical "accompaniment" to a ragtime piano solo (at 0:36). Composing mostly alone in his home-built studio, Geesin developed a personal, self-taught way of working with technology. According to Nick Mason (2004, 287-288), he had sparked Waters' and Mason's interest in studio production and this influence is clearly evident in Waters' "Several Species.." track. Mason points out that:

> Ron passed on a variety of tricks with Re-vox tape recorders hooked up in tandem that went well beyond the bounds of standard use as recommended in the manufacturer's manual. He did all his own wiring and instructed me in the rudiments of soldering. [...] Apart from anything else Ron taught me to splice tape beautifully. (Mason 2004: 288-289)

The tape recorder setup that Mason describes is also confirmed by Geesin himself in an interview with Klemen Breznikar in 2016:

> As a 'one man operation', I was fairly hooked at that time on a long delay tape system that played the magnetic tape across, or between, two machines so that everything that was picked up on the playback head of the second machine could be fed back through the mix onto the record head of the first machine[22].

This long delay tape system that Geesin is referring to was used by Terry Riley in Paris in 1963 during his involvement in making music for the experimental play *The Gift*. Riley's idea stemmed from experiments with an Echoplex device[23] and its optional feedback effect, which made the incoming signal echo and loop at the same time. Consequently, following an idea from Riley's assistant, who was a studio engineer from the French National Broadcasting System (ORTF), two tape machines were placed at a suitable distance apart

22 See http://www.psychedelicbabymag.com/2016/01/ron-geesin-interview.html (accessed on March 11, 2019).

23 This device was introduced in 1959 and contained two or three tape heads whose relative distance could be adjusted resulting in a variable delay of the incoming signal (Meyer et al. 2014: 359).

with the same tape threaded onto both of them. Then, having the first machine switched to "record-mode" and the second to "play mode", the delayed signal passing from the second machine would be fed back to the first machine where it would be combined with the incoming signal, resulting in feedback loops that (depending on the feedback level) would fade out in time or get continuously louder until they saturated the tape (Meyer et al. 2014: 357-359). What needs to be mentioned here is that although Riley is usually credited as a "pioneer" of this long delay tape system, this is far from true. A similar technique was also used by Gottfried Michael Koenig to create whole structures for his piece *Klangfiguren I*[24].

Furthermore, returning to *Ummagumma*'s production, from what we can tell from Mason's contribution to the album (the three part piece "The Grand Vizier's Garden Party"), Geesin's influence on how to experiment in the studio did not leave him untouched either. The second part, entitled "Entertainment", could actually be considered an interesting *musique concrète* composition, with Mason exploring different kinds of production techniques using material from a variety of percussion instruments. The piece starts with a timpani fed through a Binson Echorec device (Guesdon and Margotin 2017) probably turned to "feedback mode" with the delay time of the repeats being controlled by hand, resulting in raising and lowering the pitch of the output. From 0:14, discrete sounds of a gong, cowbell, triangle and a snare drum are placed around the stereo image and in combination with the timpani sounds they form a slow rhythmical sequence. However, our attention is mostly attracted by the following events: from 0:25 to 1:30 we hear a "melody" in the background of the mix which sounds as if only the "wet" reverberant signal of a (sped-up?) vibraphone sound was used. The same technique is more recognisable from 2:02-3:11 on the melody being played in unison by a marimba (left channel) and a flute (right channel), this time accompanied by

24 Gottfried Michael Koenig, answers to a questionnaire for a documentary about electronic music at the WDR in Cologne, 1 July 1964, Koenig's private collection.

reversed timpani sounds[25]. In the next section (around 3:11), we hear again the "wet" signal of a reversed timpani sound which at 3:27 is abruptly cut by several gaps of "silence". The segment evolves (3:38-4:30) with more fragments of other percussion material (snare drum, cymbal, wood block and tom rolls) being combined, shuffled and interpolated by short "mutes". As Guedson and Margotin (2017) speculate, these gaps were probably created by splicing short leader tape pieces at different points of the recordable tape, resulting in a variety of fast-changing collages.

The above description of how Mason used some of the technology of a recording studio at his disposal can be compared to some of the techniques Stockhausen used to create his early pieces *Konkrete Etüde* (1952), *Studie I* (1953) and *Studie II* (1954). In *Konkrete Etüde* and *Studie I*, Stockhausen spliced leader tape with magnetic tape in order to create "silences" in his structures where needed, or cut his own onsets and decays using scissors and then mounted them on leader tape in order to create a variety of amplitudes (Maconie 2016: 97-97; 117-118). Additionally, to create the tone complexes for *Studie II,* he used only the the "wet" signal created when sending a short burst of sound (made out of sped-up tone sequences) to a reverberation chamber and then cut the onset of the result to keep only the steady reverberant sound of the tone mixture (Maconie 2016: 122-123).

2. Henry Cow: A (brief) correspondence with Fred Frith

Before the categorisation of the different emerging rock idioms of the late 60s and early 70s by the record companies and rock journalists (Macan 1997: 126), it was completely normal to see for example (as we mention in the previous section) AMM sharing a stage with Pink Floyd, and Henry Cow in their turn to make their first public appearance at the Architects' Ball in May 1968 supporting Pink Floyd (Wright 1995: 2). Despite the fact that Henry Cow's first steps coincided with the late 1960s' psychedelia, the band (after many

25 If we play this part backwards we can clearly hear the original timpani performance.

changes in line up) had to wait until 1973 and 1974 for their first two releases, *Legend* and *Unrest* respectively, which actually formed their sound. Henry Cow's music was quite multifaceted and very different from the rest British rock bands of the early 70s (usually labeled as "progressive") because it blurred the aesthetic boundaries between 20th century avant-garde, free jazz, rock and free improvisation. The band would refer to composers/groups like Varése, Elizabeth Lutyens, Béla Bartók, Frank Zappa, John Coltrane, Syd Barrett, Soft Machine and Captain Beefheart as influences, to name a few (Ansell 1975; Wright 1995: 2). As Chris Cutler (the band's drummer) points out, a crucial role in developing this eclectic taste was played by recording technology with which "music of all kinds is more or less equally available", and secondly the "voracious appetite" Henry Cow had for sound (Wright 1995: 2).

This section is formed around information deriving from a brief email correspondence I had with Fred Frith, one of the founding members of Henry Cow and known for his work as a solo improviser using electric and acoustic guitar. Frith mentions on his website that

> [d]uring the Henry Cow years I fell in love with the recording studio and its endless possibilities. I embrace the idea of the "work" as an unfinished and constantly mutating entity. Collaboration, improvisation, sculpting sound in the studio, and treating composition as an open-ended process remain central to how I make music.[26]

Being particularly interested in the ways studio and recording technology played a role in shaping Henry Cow's music, I asked Fred Frith about what production techniques he remembers using, the compositional or aesthetic aspect of them and some more specific questions about tracks that attracted my attention.

Asked about his first experience in experimenting in a recording studio and what production/recording techniques he recalls, Frith added:

> I had fooled around with tape recorders starting in about 1963. First while staying with a family in France at the age of 14 and recording rhythm guitar

26 See http://www.fredfrith.com/ueber-mich/ (Retrieved on March 20, 2019).

> tracks of Beatles songs on their Ferrograph and then performing over it while singing and playing lead guitar. Family entertainment! Later I bought an Akai tape recorder (1967?) and messed around with bouncing tracks from side to side and generally learning stuff about getting good sound quality over several bounces and surprising myself with happy accidents. I was still working like this as late as 1973 (I submitted a home-made tape called Fred Frith's Fractious Fragments to Virgin Records which led to their asking me to make Guitar Solos in 1974. But real studio experience started in 1973 with Henry Cow's first album, recorded at The Manor. We had a LOT of material, so we were mostly focused on getting it down on tape, but as we did so we quickly came to a more sophisticated understanding of what was possible. We were lucky enough to have an engineer—Tom Newman–who supported our hands on involvement and mentored us. He was in the middle of producing Mike Oldfield's Tubular Bells, and really understood the medium as well as anyone I've ever come across. He didn't hesitate to puncture egos and give hard feedback while keeping out of our argumentative way! With Tom we learned about overdubbing, equalization, use of reverb, and other basic stuff – noise reduction, compression, how to use input gain, how to watch those meters. It was a great education. At that time there was not so much editing, because we already had the material, and we were using the studio in the classical way – making as accurate a recording as possible. But we did start to experiment with creative overdubbing to cover mistakes, for example. Extraneous material used for creative effect. Tom taught me how to do more with less. He could create a drum track by tapping a microphone with a pencil and then equalizing the results to make them sound like anything from a bass drum to a hi-hat. Genius! [27]

What struck me here is the importance of the studio engineer for a band's musical output and the fact that she/he could be considered as an extra creative member of the group. Additionally, what is very interesting is the notion of "doing more with less", where Frith describes Tom Newman's skill in creating a drum track by using recordings of found objects like a pencil. This could be compared to Waters' and Geesin's experiments using body-generated sounds to create music (see previous section). It could also be compared to the attempt of Varése's assistant Anton Buczynski to simulate the sound of footsteps in *Poéme électronique* by shaking a wooden cigar box with gravel inside[28], and indeed the work of foley artists in all kinds of radio, TV and film contexts.

Moreover, following my interest in highlighting connections between

27 Fred Frith, personal communication, October 31, 2018.

28 The "footsteps" are audible from 4:40 until 5:34. Buczynski knew this trick from radio plays and proposed it as a solution to Varése's request (Tazelaar 2013: 146).

rock music and practices in the field of electro-acoustic music, I also asked Frith if the experiments in electroacoustic music was a reference point for the rock musicians when dealing with studio technology; and if anybody wanted to imitate specific techniques. Frith:

> Making Unrest in 1974 was the next step in our education, and for that record we had much less material and an unprecedented access to studio time (6 weeks If I remember rightly). We had heard a lot of what was happening in the field of what I'll call academic electronic music – I had explored (on record) electronic and electro-acoustic music by Pousseur, Mimaroglu, Stockhausen, Cage, Varése, without having much of a clue how it was made. We also were becoming increasingly interested in improvisation, and we started out in the studio by improvising in all kinds of configurations, and then listening back to what we'd done and projecting possible uses of this material as the basis for studio composition. This involved such things as 2-inch tape loops (Deluge) where we could mix 16 tracks continuously as the tape ran around the room, making the contrast between familiar and unfamiliar the center piece of the work. In this case someone inadvertently pressed play on a two track machine which had a mix of Ruins on it, but the machine was set at half speed. We liked this juxtaposition so much that we recreated it carefully as a long crossfade which ended with a recording of John singing and playing piano on a fragment of his. I think this was a revelatory moment in all of its aspects. Understanding the value of process and accident in creative work, intuitively grasping what happened when you didn't try to make the voice and piano sound "good" but rather projected a scenario where someone is playing half heard at the other end of a room, thus invoking the sense of a sound-track to an imaginary movie. It broadened our idea of "music" and led us fearlessly to try many other experiments involving editing, flipping the tape and reversing the material, defacing the tape to make random cuts in any given line, basically seeing how far we could go with the physical medium. This was done in a purely pragmatic, empirical way, not through study of methodology of other practitioners however inspired we may have been by (some of) them. The fact that we had so much studio time (the last time on my life that this has been the case other than 6 weeks at the National Film Board of Canada in Montreal for my first ever soundtrack in 1986, which was also a huge and life-changing luxury) was critical in defining for ourselves a way of working which we have been actively engaged in ever since.[29]

This notion of approaching technology intuitively and letting happy accidents happen is something I find extremely interesting in Frith's words. It can be compared to the way an electroacoustic composer could work in a studio. In fact, as Daniel Teruggi (2007) reveals, an accident in a record's groove that made it loop endlessly was responsible for the discovery of musique concrète

29 Fred Frith, personal communication, October 31, 2018.

by Pierre Schaeffer in 1948. Interestingly, this loop happened after the attack and during the sustained part of the sound of a bell, resulting in a sound reminiscent of an oboe – an accident that made Schaeffer think differently about sound and technology. Returning to our story, Frith's example of somebody accidentally pressing play on a tape machine that had a mix of another track ("Ruins") and was set to half-speed, seems to be a moment that revealed a set of possibilities that could be approached creatively. Consequently, both Schaeffer and Henry Cow "recreated" their accidents and applied them in their creative process.

Furthermore, asked about how they worked with tape besides editing for the sake of a smooth transition, Frith noted:

> Well, sometimes we edited for the opposite reason—to NOT make a smooth transition! We flipped the tape to create backwards effects (a nightmare of course because the tracks are reversed and so it's easy to record on the wrong track), we edited, we dropped things in and out, the usual. We were equally engaged in exploring processing, especially what happens when you use things in ways that were not intended—compression, expansion, extreme equalization, radical use of reverb, or NOT use of reverb. One thing we discovered was that tape was so well-made and hardy that it was very difficult to corrupt it. Even if you stamp on it or bury it or crumple it, it ends up still sounding the same! What's striking now is that we were INTERESTED in this idea of corruption…[30]

What we can point out here is the approach to use technology and the medium in "non-traditional" ways, thus giving it a different function. For example, the audible splice (something that is usually avoided) that occurs in the track "Ruins" around 3:42 creates a very interesting "musical tension" between the sound materials. The same thing happens in the section that starts at 5:36 where two kinds of sound groups (xylophone-bass-snare and bassoon-violin) are alternating just by splicing tape pieces[31]. This tension happens because the listener has to adapt to unexpected changes of different virtual acoustic spaces which the production is creating: from close-miked to more "roomy-sounding" instruments. This construction of space could also be

30 Fred Frith, personal communication, October 31, 2018.
31 The splices are audible at 5:36, 6:12, 6:45 and 7:01.

achieved with the use or not of reverb as Frith mentions. A characteristic example of this can be heard at 0:57 of the same track where the xylophone moves quickly from a very "wet" to a very "dry" sounding space, thus creating a "far-to-close" movement simulation – something that happens frequently in Stockhausen's *Gesang der Jünglinge*.

Being especially interested in learning more details about how specific parts or sounds were created, I asked Frith a set of more specific questions. Regarding the ending section of the *Legend* track "Teenbeat (Introduction)" (4:32-5:18), where overdubbed layers of sound are combined, Frith revealed that:

> The introduction up to (and beyond) the big anthemic first part of Teenbeat were recorded in one take, but afterwards we added a lot of extra voices to the anthem itself, it was not the overlaying of other takes, it was addressing what we had made and adding to it. I was aware of Grateful Dead's Anthem to the Sun (which had a strong effect on me) and I know now that Phil Lesh studied at Mills with Luciano Berio and used many experimental tape techniques, including overlaying multiple takes of the same song. But I didn't know that then![32]

The same thing happens also in the track "The Tenth Chaffinch" where voice overdubs are added on top of a recorded free improvisation[33], creating a unified group of sounds that at some points contrasts and at others interacts with the instrumental parts. Indeed, as Frith mentions above, Luciano Berio's technique of creating collages by superimposing internally coherent but unrelated sound groups could be compared with what we hear in "Teenbeat (Introduction)" and "The Tenth Chaffinch". Influenced by Vladimir Ussachevsky's *Sonic Contours,* which is a montage comprising natural and manipulated (speed playback, reversing, etc) piano sounds[34], Berio used a similar technique to compose his tape piece *Perspectives* (1957) – this time using layers of pitch groups that were created by splicing together fragments of sine-tones and then manipulating them by looping, changing the speed playback and/or reversing (Osmond-Smith 1991: 14). This notion of using

32 Fred Frith, personal communication, October 31, 2018.
33 This section is audible from 1:22 to 4:02.
34 See *Luciano Berio: Two Interviews* (Berio, Dalmonte, Varga & Osmond-Smith 1985: 11)

groups or layers of sounds that form larger structures which interact with each other gives an emphasis to the ensemble rather than to the soloist – something which has a lot in common with how Henry Cow approached their improvisations. Other "out-of-the-box" approaches in Henry Cow's production can be traced in the track "Ruins" (*Unrest*) at around 2:13, where Tim Hodgkinson improvises using a Farfisa organ fed through some distortion[35] completely changing its "natural" sound. Furthermore, at 7:25 of the same track, the hard-panned guitar sound that comes in contrast with the rhythmical riff at the background, was created, as Frith recalls, by "having a pickup installed over the first fret, and using a tapping technique and two volume pedals to have the two "sides" interact with each other"[36].

What can be said about Henry Cow is that they mostly functioned like an experimental rock ensemble rather than a typical rock group of the 1970s – consciously following the path of experimentation and a DIY aesthetic in using the studio to fuse their musical influences with the rock idiom. As we saw in this chapter, the Beatles played a crucial role in "promoting" studio experimentation as a method of composing in rock music. Despite the fact that the Beatles are heavily cited by many bands as a major influence, according to Frith, in the case of Henry Cow Frank Zappa's studio work was a significant landmark for them:

> It should be added to what I said in my responses that we were, I would say, heavily influenced by Uncle Meat-era Zappa, especially with the IDEA that you could do serious experimental work in the field of rock, and with the sense that the studio was the creative center of this work. So a strong conceptual/philosophical connection but without necessarily consciously trying to imitate specific techniques[37].

Fred Frith's "post-script" to our email correspondence couldn't have been a better interlude for our next chapter, which deals with Zappa's studio experiments in the late 1960's.

35 Fred Frith, personal communication, October 31, 2018.
36 Ibid.
37 Ibid.

-Chapter IV-

"A.A.A.F.N.R.A.A."[38]

Frank Zappa's work, in particular his studio techniques, have been very influential in my music-making. Thus, before I can discuss my own work, it is necessary to highlight some of Zappa's studio compositional and production techniques and try to understand the artistic intentions behind them. For this section I will concentrate on three early albums of Frank Zappa and The Mothers of Invention, namely *We're Only in it for The Money* (1968), *Lumpy Gravy* (1968) and *Uncle Meat* (1969). Rather than analyzing in detail every album separately, I will focus on some studio techniques that characterize these albums. Moreover, I will try to point out how certain techniques connect to experiments in the field of electroacoustic music. In addition, to cast more light on some of Zappa's adventurous experiments in the studio I will use information taken from a personal communication with recording engineer John Kilgore[39], one of the voices from the inside-piano conversations that Zappa recorded for *Lumpy Gravy*. Frank Zappa's recorded musical output has attracted the interest of many researchers in recent years because of its diversity and uniqueness, characterized by the ease with which his music could jump stylistically from r'n'b to *musique concrète* and from contemporary to jazz without losing its rock character. The basic tool that allowed him to achieve this kind of musical eclecticism was the recording studio and the possibilities offered by it.

38"Anything, anytime, any place, for no reason at all" (Zappa 1989:163).

39 According to his website, John Kilgore worked as an apprentice at Apostolic Studios in NYC between 1967 and 1969. There he observed Frank Zappa as he made the albums *We're Only In It For The Money, Lumpy Gravy, Uncle Meat* and *Cruising with Ruben & the Jets*. Retrieved from: https://www.johnkilgore.com/about-1 (accessed on April 29, 2019).

Overdubbing, sound-on-sound

One of the most commonly used techniques in these albums is (half-speed) overdubbing. This was an additive process in which various sound materials are layered in temporal succession and later combined at the mixdown stage (Frith, Straw & Street 2011: 9). Kevin Ryan and Brian Kehew describe thoroughly the half-speed overdubbing technique in their book entitled, *Recording the Beatles: the studio equipment and techniques used to create their classic albums*:

> Using this technique, the band would record a backing track at the machine's fastest speed [...]. Then, with the machine running at its lower speed (and with the tempo of the song therefore halved), George Martin and/or one of the Beatles would record an overdub, playing along slowly at half-speed. By necessity, the part would also have to be performed an octave lower than it was to be heard on the final recording. When the tape machine was then returned to regular speed, the newly recorded part would play back twice as fast and an octave higher than it had been performed (Ryan & Kehew 2009: 288).

Zappa's early albums feature overdubbing techniques extensively. According to Barry Miles (one of his biographers), when Zappa took over Pal Studio from Paul Buff and renamed it *Studio Z* he would sit there spending most of the time recording and overdubbing, and this acted as a workshop on how to use the studio equipment (Miles 2004: 80-83). The most striking example of overdubbing can be traced in the track "The Chrome Plated Megaphone of Destiny" from *We're Only in it for The Money* where numerous kinds of sonic material create different groups of textures. For example, at 1:12-2:40, notice what happens at the background of the mix with several layers of recorded clapping and other material, as well as at 3:17-4:25 where different speeds of recorded laughter are overdubbed. Furthermore, in the track "Lonely Little Girl" we can hear two kinds of overdubs. The lead vocals have been recorded on a tape machine running slower, and when played back at normal speed they sound speeded-up (Slaven 1996:213). Additionally, towards the end of the track (0:59) we can notice a very similar technique to Les Paul's, but this time applied to two guitar tracks. In the track "Dog Breath" (*Uncle Meat*) the

vocals and instruments are treated analogously, as described by Paul Borders when he discusses the linear notes of the LP: “Things that sound like full orchestra were carefully assembled, track by track through a procedure known as over-dubbing [...]” (Borders 2001: 158). Another interesting technique based on overdubbing is noticeable on *Lumpy Gravy*. During the recording sessions Zappa would have the orchestra play their parts backwards, keeping in mind the “aural” effect of the reverse playback – by listening carefully at 7:48-7:56, 8:00-8:03 and 8:13-8:22, this method of overdubbed reversed playback is audible (Borders 2001: 134). Another interesting aspect of overdubbing is the possibility of creating depth in the mix (how close or far away something sounds) by adjusting the level balance between two or more tracks. An example of that is the vocal tracks in “Flower Punk” from *We're Only in it for The Money* where at 0:03 we hear that the pitched up vocal track is combined with an overdubbed vocal track at normal speed which sounds “far away” because it is lower in the mix. Similarly, at 0:52 the shouted vocals sound as if they are recorded at a distance and placed “behind” in the mix creating an illusion. Besides overdubbing and reverse playback, Zappa used the tape machine in various other ways as an extra musical instrument to achieve the sounds he had in his mind or to discover new sounds. Using the varispeed control he would alter the pitch and time duration of the sound material in order to change the timbral characteristics of the sound. The middle section of the track “The Idiot Bastard Son” where different mouth-produced sounds (speech, snorks, etc) are pitch shifted or stretched reveal this kind of tape manipulation. All of these techniques would have never been possible if it wasn't for the electromagnetic tape. The musicians of the 60's had to work with the technology available and the restrictions that followed it.

This technique of sound-on-sound recording is far from new, as it goes back to the 1890s when it was first applied to Edison cylinders (Sanjek 1988: 235). Les Paul — a pioneer of the electric guitar — was one of the first

musicians to popularize and experiment with many types of overdubbing techniques in the 1950s using a homemade disc cutter in his garage studio (Bell 2018:12). A characteristic example of Les Paul's approach to overdubbing can be found on the tracks “Lover” and “Brazil” from 1948 and “How High The Moon” from 1951. In addition, similarities to how Zappa was alternating the pitch of the vocal tracks can be traced on Joe Meek's experimental pop album *I Hear A New World* from 1960. Meek is considered as one of the first producers/engineers to approach the recording studio as an instrument and some of his techniques were multiple overdubbing, pitch shifting, reverb, close miking and sampling (FACT Magazine: Music News, New Music., 2013, Patrick 2013). Considering that Meek's album was not well known at the time, we can speculate that it is not impossible that Zappa was aware of it (since he was always interested in obscure and less known styles of music) and somehow affected his way of composing in the studio.

Moreover, superimposition of recordings can be found used often in Pierre Schaeffer's early studies as well as the piece he composed with Pierre Henry, *Symphonie Pour Un Homme Seul* (1949-1950) however, the process of making these pieces had to include as few overdubs as possible because of the increasing surface noise when copying from one disc to another (Maconie 2016: 90). In addition, important similarities with overdubbing can be traced in the early tape works of Stockhausen. In 1952, when Stockhausen was invited by Boulez to visit the Club d' Essai studios in Paris for the first time, he started working on his first tape study, *Konkrete Etude* (Maconie 2016: 91). For the tape study he isolated, pitch-shifted and combined small segments of sounds in layers (recorded from a prepared piano tone) (Toop 1976: 295-296) with the intention to “create artificial tones whose inner structures were microcosms or scale models of the form of the entire work” (Maconie 2016: 97). Stockhausen continued to use similar techniques of superimposed sound layers in his later pieces *Studie I*, *Studie II*, *Gesang der Jungelinge* and *Kontakte*. Furthermore, another important similarity with how Zappa created depth in

the mix can be found in what Stockhausen called multi-layered spatial composition. In his lecture given at Oxford Union in England on 6 May 1972, he stated that "building spatial depth by superimposition of layers enables us to compose perspectives in sound from close up to far away" and gave the example of "someone whispering very softly in your ear while a thunderstorm or a rocket taking off is going on ten miles away" (Stockhausen 1972), which is comparable to what is happening in Zappa's track "Flower Punk" as we mentioned before.

Sound collage/montage

In these early albums by Frank Zappa, sound collage plays a prominent role in his creative palette of production techniques. Albums like *We're Only in it for The Money* and *Lumpy Gravy* feature sound collage techniques heavily. John Kilgore, who was then working as a "night manager" at Apostolic Studios, was present during the time Zappa was working on these two albums. As he recalls, Zappa had recently obtained all the masters from his previous albums and asked him (Kilgore at that point knew absolutely nothing about sound engineering or production!) to twiddle the varispeed control as he was playing these tracks on the 12-track tape machine. The idea behind that was to collect material that then he would use for a custom made box he called the "Apostolic Blurch Injector" (see Figure 1) which was simply a make-or-break contact device with 12 switches. Each switch corresponded to one track of the tape machine running so Zappa would press these buttons like playing an instrument to produce sound collages from the material in the tape. These collages can be heard in "Nasal Repetitive Calliope Music" and "The Chrome Plated Megaphone of Destiny" as well as in many other pieces. The compression and distortion at some points owes much to the simplicity of this custom-made box (which according to Kilgore had its drawbacks - whenever a contact was made it made a "pop") and to the hand-built console[40] with its

40 The hand-built console at Apostolic Studios was in a way the first API product made by

Malcore compressors sitting at the left center and right busses (John Kilgore, personal communication, 21 June 2018).

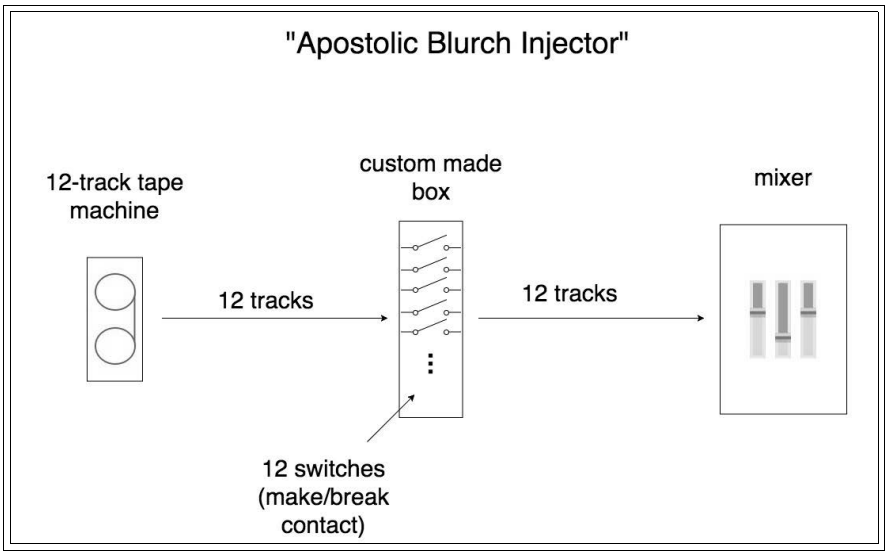

Figure 1: Graphic illustration of the device as described by John Kilgore. Made by the author.

The most remarkable examples of Zappa's collage techniques, though, appear in the way he assembled the *Lumpy Gravy* album. Borders (2001: 127) points out that the editing, the post-recording production and the organization of sound played the most crucial role in Zappa's compositional process. The whole album is a collage of sound fragments and material of various durations and qualities – from orchestral tonal/atonal music played by a small studio orchestra or a pop combo to tape-manipulated sound and recorded spoken word. Borders continues by stating that the album's structure follows a variation-rondo form because of a recurrence of a theme which is slightly varied each time (Borders 2001:128). On the other hand, Jonathan Bernard (2011) point's out that during the questions after a lecture Zappa gave in 1969, he noted that the aleatory aspect of the Happening had an influence on *Lumpy Gravy*:

> The way *Lumpy Gravy* was put together was sort of like that; I had a certain number of building blocks to work with, all committed to tape, and at one point I just cut these lengths of tape and just shuffled them around, and stuck them together; and there are sections that were assembled that way[41].

Saul Walker and Lou Lindauer who later formed the company of that name (John Kilgore, personal communication, 21 June 2018).

41 Transcribed from recording by Bernard in his paper "From *Lumpy Gravy to Civilization*

John Kilgore revealed some important information about this and indicated the exact points where the material is organized in this particular way. For example, chance was used in “Part I”, at 3:48 and 5:45, and in “Part II” at 0:50, 3:56 and 6:46[42]. This approach can be also compared to the way György Ligeti's electronic piece *Artikulation* (1958) was put together. For *Artikulation*, Ligeti categorized his material according to certain sonic characteristics and then randomly chose his 'building blocks' from each category to construct the piece[43].

These approaches probably emerged from his early experiences with different kinds of arts: electronic and experimental music, graphic design in his school years and film experiments (montage and film editing) using his father's 8mm Kodak wind-up cine-camera (Miles 2004: 21-35). Besides music and sound, Zappa was always fascinated by graphics and visuals. According to Miles (2004: 27; 41), he liked the way music notation looked on paper and spent quite a long period of time writing notes without knowing how they would sound until he found someone to play them. Moreover, film was always something that interested him throughout his life – *Uncle Meat*, *Burnt Weeny Sandwich* and *200 Motels* were all music albums that also functioned as soundtracks for the movies or film projects with the same titles. The impact of the cinematic practice on the music is prominent: in *Lumpy Gravy* the spliced recordings of different unrelated material (such as conversations, monologues, orchestral passages and others) can certainly be described as something similar to film scenes which are scattered throughout the album and reappear several times. The same can be said as well for the *Uncle Meat* album where carefully constructed instrumental tracks are interrupted by recorded monologues (with themes deriving from the everyday life of the band) or raw unedited live recordings from tours.

Phaze III: The Story of Frank Zappa's Disenchantment “ (2011:11)

42 (John Kilgore, email correspondence, 30 April 2019).

43 See https://en.wikipedia.org/wiki/Artikulation_(Ligeti)#cite_ref-13 (accessed 20 October 2019)

As far as sound is concerned, at times there is strong resemblance between Zappa's usage of studio techniques and experiments in the field of electroacoustic music. In tracks such as “Nasal Retentive Calliope Music” where fragments of recorded tape are combined in time and the sound material is manipulated by alternating the playback speed of the tape machine using a varispeed control, a connection with *musique concrète* is inevitable. In 1948, Pierre Schaeffer, using primitive recording facilities and recording on soft acetate instead of tape, made his sound montage by creating a closed groove on the disc and utilizing the varispeed mechanism of the turntable to change the pitch, tempo and timbre (Maconie 2016: 90). Furthermore, we cannot dismiss Zappa's (repeatedly stated and rather well known) admiration for Varése's music. Undoubtedly, there is much literature covering Varése's influence on Zappa's orchestral music[44]. On the other hand, not so much has been written about his influence on how Zappa treated sound in the studio by splicing and transforming sounds using the tape. Judging from the fact that Zappa was a record collector and kept on looking for records of Varése's music after an unsuccessful attempt to meet him[45], we can speculate that he was thinking of *Poéme Electronique* or *Déserts* when making all of his collage pieces or the humorous sound transformations scattered around his early albums.

Improvisation, chance operations and found objects

John Cage was mentioned by Zappa in an interview[46] as another major influence, especially on the *Lumpy Gravy* album. Everyday-life sounds were always a big part of Zappa's music: snorks, conversations and all kinds of “noises” were used some times to play a more accompanying role and at other

44 See Slaven's *Electric Don Quixote: The Definitive Story Of Frank Zappa*. (1996), Miles's *Zappa* (2004) and Carr's *Frank Zappa and the And* (2016) to name a few.

45 See Miles (2004: 35-47) and Zappa's article on Varése, *Edgard Varése: The Idol of My Youth* (Ubu.com 2018)

46 See Miles (2004: 168) and Afka.net. (2018).1968-01 Zappa and the Mothers: Ugly Can Be Beautiful. [online] Available at: http://www.afka.net/Articles/1968-01_The_Village_Voice.htm [Accessed 11 October 2018].

times to be in the foreground of the music. The pig sounds, typical of many of Zappa's recordings, firstly appeared in one of his early releases "How's Your Bird?" (1963), recorded in the Pal studio with Paul Buff, and one of his early endeavours to record his own popular music (Miles 2004:68-69). Another fact that proves Zappa's openness to any sound and experimentation is his appearance on the Steve Allen Show in 1963. Wanting to get some exposure as a "serious" composer and as a jazz musician he offered to play music using a bicycle in order to attract attention. Nevertheless, he took his job seriously and showed to everyone watching all the different kinds of sounds that can be produced by hitting the tyre frame, plucking and bowing the spokes or blowing through the handlebar of a bicycle (Miles 2004:70). He even asked from everyone to participate in an improvisation where the musicians of the show were asked to make any noise possible while him and Steve Allen would "play" the bikes. Some of the characteristic sounds of hitting the spokes using a drumstick made their way to the *We're Only in it for The Money* album and can be heard clearly in the track "The Chrome Plated Megaphone of Destiny" at 4:37-5:28.

As previously noted, Zappa was always interested in introducing spoken word as musical material or as a medium to tell a story. According to John Kilgore, sometimes Zappa would leave a tape machine running and recording in the control room with a hidden microphone somewhere:

> [...] one of the things that he did a lot of was that he would have people come to visit him because he was there [Apostolic Studios] all the time, and there would always accidentally be an open mic with the tape machine running and he was talking to them, and when the police came in the middle of the night because the downstairs neighbours were complaining about noise, he would record that and all these things would end up in his quiver and he would end up using them somehow (John Kilgore, personal communication, June 21, 2018).

Another production/composition technique was to record conversations from various people (using a pair of U-87 microphones) taking place under a grand piano covered with a blanket while the sustain pedal was down (with a sandbag on it) (Miles 2004: 158). The sound of the voices would resonate the

strings of the piano adding a more sonorous and musical element to the outcome. After careful listening we can understand that the choice to use both female and male voices was intentional. People have different voice registers and speech comprehension so that every time a person talked a different part of the piano strings and body would resonate. John Kilgore, one of the people who participated in these "inside-piano" conversations, mentions that Zappa was interested in the concrete elements of the spoken word (rhythm, pitch, timbre) and not so much in the content and the semantics[47] (John Kilgore, personal communication, 21 June 2018).

> People at first were thinking "what do you want us to do?" because he was somebody who did absolutely direct what was happening, [...]. So everybody in the piano and we said "what do we do?" and he said "I don't know just do what you do, I'll give you a topic" and he would give us a topic and we had to spin it out you know, not under his direction, and he just collected what he thought interesting [...] (John Kilgore, personal communication, June 21, 2018).

In relation to these inside-piano conversations, Borders (2001:128,156) asks us to compare the monotonous voices of the *Lumpy Gravy* section (4:47-5:17) to John Cage's *Indeterminacy: New Aspect of Form in Instrumental and Electronic Music* as it seems that this part was inspired by Cage's piece (although the only resemblance lies in the character of the voice). In addition, Michel Delville[48] goes a step further and states that Zappa's propensity to work with found text, many uses of collage and mixed-media happenings and concerts (like those that happened during The Mothers of Invention's residency at the Garrick Theater in 1967) reveals a connection with Dada, a movement which attempted to intergrade art and life.

Moreover, the use of recorded spoken word as timbre leads us to make connections with early *musique concrète* pieces, such as Schaeffer's *Etude Pathetique* where the usage of looped syllables plays a prominent role. Additionally, we also see some resemblance to Stockhausen's *Gesang der*

47 See also Zappa's explanation on how he listens normal speech as a piece of music in Neils Slaven book: *Electric Don Quixote:The Definitive Story of Frank Zappa* (2003: 215-216).

48 See "Zappa and the Avant-Garde: Artifice/Absorption/Expression" in *Frank Zappa and the And*, ed. By Paul Carr (2016:185-200).

Jünglinge and its integration of a boy's recorded voice with speech-like qualities electronic sounds (Maconie 2016: 149-154). Last but not least, we can easily speculate that William Burroughs' cut-up technique – which, during his stay at the Beat Hotel in Paris moved as a practice from the domain of the written text to that of sound (Meyer 2014: 354-356) – also affected Zappa's compositional approaches in the studio. Zappa even read from Burrough's novel *The Naked Lunch* in 1978 on a night celebrating the work of Burroughs in New York and also talked with him backstage and proposed to adapt *The Naked Lunch* into a Broadway musical, which never happened (Miles 2004: 298).

Although Zappa from the early 1970s onwards started gradually to abandon technical experimentation in the studio, he never neglected it completely. What Zappa called "xenochrony" – a made-up term that comes from the Greek words "xenos" (ξένος: strange or alien) and "chronos" (χρόνος: time) – was a technique where he combined various tracks that shared the same tonality but were recorded at different times and locations. In this way, since the tempo and time signatures of the tracks were unrelated, the final result comprised rhythmic relationships impossible to achieve in other ways. He used "xenochrony" on many albums and some examples of it can be traced in the tracks "Nine Types of Industrial Pollution" (*Uncle Meat*), "Friendly Little Finger" (*Zoot Allures*), "Rubber Shirt" (*Sheik Yerbouti*) and in every guitar solo in *Joe's Garage* excluding "Watermelon in Easter Hay"[49].

Furthermore, we should point out that a tool that transformed the way Zappa was working in the studio was the Synclavier[50]. Before discovering it in the mid-1980s, most of his recorded output since the late 1970s had been far away from studio experimentation and was either recorded live or sounded as

49 See Delville's chapter "Zappa and the Avant-Garde: Artifice/Absorption/Expression" in *Frank Zappa and the And*, ed. By Paul Carr (2016:185-200).

50 The Synclavier was an early digital synthesizer which could also function as a polyphonic digital sampling system and a music workstation. It was manufactured by New England Digital Corporation of Norwich, Vermont and produced in various forms from the late 1970s to the early 1990s. Information retrieved from https://en.wikipedia.org/wiki/Synclavier [Accessed on 21 May 2019].

if it was played live. With the Synclavier, as Miles points out, Zappa had a chance to compose music using a medium whose emergence was predicted by Varése in 1939; a machine that "would be able to beat any number of desired notes, any subdivision of them, omission or fraction of them – all these in a given unit of measure of time which is humanly impossible to obtain"[51]. A very interesting example of what Zappa could do with the Synclavier is the 12-minute track "Porn Wars" from the album *Frank Zappa Meets the Mothers of Prevention* (1985) where he creates a sound collage made out of layers of voice material altered in pitch (very reminiscent of Berio's tape pieces) combined with some Synclavier virtual instruments and unused under-the-piano recorded material taken from the *Lumpy Gravy* sessions.

His most remarkable work with the Synclavier, however, is the album *Civilization: Phaze III*, released after Zappa's death, in 1994. Here, Zappa takes advantage of the digital technology and pushes the instrument to its limits. Having at his disposal a vast variety of samples, including many played by the Ensemble Modern in 1992 (Miles 2004: 369), and the possibility to manipulate the sound in almost infinite ways, he created an album consisting of recorded dialogues, short and long tracks composed for the Synclavier 'digital orchestra', the Ensemble Modern and sometimes a mixed combination of the two (Bernard 2011: 23). Additionally, *Civilization: Phaze III* connects conceptually with *Lumpy Gravy*. The inside-piano dialogues create a connecting thread between the two albums since part of the 'scenario' begun in *Lumpy Gravy* is continued in *Civilization: Phaze III*. In both albums, Zappa uses fragments of orchestral music with the main difference being that in *Lumpy Gravy* he uses a real orchestra, whereas in *Civilization: Phaze III* a sampled virtual orchestra. Another connection can be detected in his experimentation with the medium. In *Lumpy Gravy* he experiments with tape manipulation to alter his material, while in *Civilization: Phaze III* he uses the Synclavier to create very diverse sound combinations, dense arrangements

51 Varése cited in Miles (2004: 319).

and rhythmic structures as found in the tracks “N-Lite” and “Beat the Reaper”. Consequently, despite the fact that Zappa made the two albums at completely different times, using very different technology, we can argue that the way *Civilization: Phaze III* is put together creates a strong connection with his late 1960s work.

In conclusion: Zappa used the recording medium extensively to express his artistic intentions. Having completely absorbed all of his influences, he used the recording studio as a compositional tool as well as an instrument to make music. Besides this, he often used a more improvisational approach with the technology available at any given time.

-Chapter V-

Compositional work

Throughout the two-year trajectory of my research, one of my intentions was also to explore in parallel the practical implementations of some compositional ideas and thoughts that derived from the previous theoretical section, where experimental rock was approached from a historical, aesthetic and technological point of view. In this chapter, I will attempt to describe the methodologies, motivations, compositional processes and techniques of my creative practice. This will be done by briefly analysing some of the study pieces I composed during the course of my research and by attempting to explain the aims behind my bigger ongoing composition *Studio Manoeuvres*, still in a work-in-progress state as I write these words, and meant to be presented in the final concert of the academic year.

Before proceeding with the description of my music I should point out some information regarding the methodology I followed and what my intentions were before and during the compositional process.

Listening sessions

Since a big part of my research deals with studio production techniques that appeared in experimental rock during the late 1960s and early 1970s, I had the very interesting task to locate and analyse them in order to understand how they work. For this to happen I pursued a number of attentive listening sessions where I concentrated on the details of certain experimental rock production and recording techniques. These listening sessions, in combination with the information found in relevant literature and my personal communication with John Kilgore (see Chapter IV) and Fred Frith (see Chapter III), helped me significantly to understand how certain

techniques functioned and hopefully reveal their artistic intentions. Another reason of doing these sessions, was also to seek for possible conceptual, technical and aesthetic similarities of techniques used in experimental rock with the field of electroacoustic music, in an attempt to approach the music on either side of the connection from a different perspective.

Experimentation

By concentrating on a few techniques that I found interesting, I started experimenting in order to explore their creative possibilities. During this process, I developed a certain compositional vocabulary and got fascinated by the possibilities of the analogue studio and the tape machines. My intention was not to do exact replicates of the techniques used in experimental rock productions, but to extract certain elements from them and see how I could use them to compose music. As we will see later in this chapter, some of the techniques explored were pitch transposition using the tape varispeed control, phasing/flanging, tape loops and delays, sound-on-sound. Moreover, inspired by some of the characteristics of the production in some examples, I designed simple patches in the analogue studio in order to approach certain aesthetic results using my own variations of already established techniques as mentioned above. The patches and their output will be discussed further in this chapter. Last but not least, I should point out that commonplace procedures like mixing and editing played an equally important, and rather central in some cases, role in experimenting and realising creative ideas in the studio.

Production techniques as tools for composition

While exploring the experimental nature of the music discussed in the previous chapters, I quickly understood that studio technologies were not used merely as a kind of 'colour' or 'effect' but became a central function of how the music was organised and shaped. For example, when the Beatles (see

Chapter II) and Zappa (see Chapter IV) were using techniques that derived from electroacoustic music, they were adding an additional layer to how rock music was formed aesthetically at that point. Therefore, my music-making was and still is heavily influenced by the ways in which rock music was transformed and organised by "performances" of studio technologies like the tape machine or the mixing console (see Chapter I). Most of the times, my compositional approach was leaning towards a more empirical, exploratory way of working than a systematic one; something which is closer to the rock music tradition. The music was shaped in the process of experimenting with different devices and sometimes the final result hardly resembled the initial idea. Consequently, the notion of learning the recording studio as an "instrument" was the main point of departure and where my work focused around.

1. *Prog Study I* (2018)

Stereo

This study piece came out of experiments using simple techniques I learned as I was getting more familiar with a certain workflow in the analogue studio. The initial idea was to create a piece where the drums, one of the most commonly used instrument in rock music, would play the leading role. The material used came from a recording session with a drummer (Dalton Danks) and the output of a "feedback patch" taught by Kees Tazelaar in the Voltage Control Techniques lectures during my participation in the one-year Sonology Course in 2017. During the recording session, the drummer was asked to freely improvise as well as to follow some precise instructions regarding the technique and style of playing (like rolls, short/long hits or rhythmic phrases on different parts of the kit). As we can see in Figure 2, a simple recording setup was used, with two handheld digital recorders placed as "overheads" above the kit and pointing in such a way to cover the most of it. After collecting the material that the recording of the drums had provided me, I

followed a process of assessment and editing in order to shape a general structure.

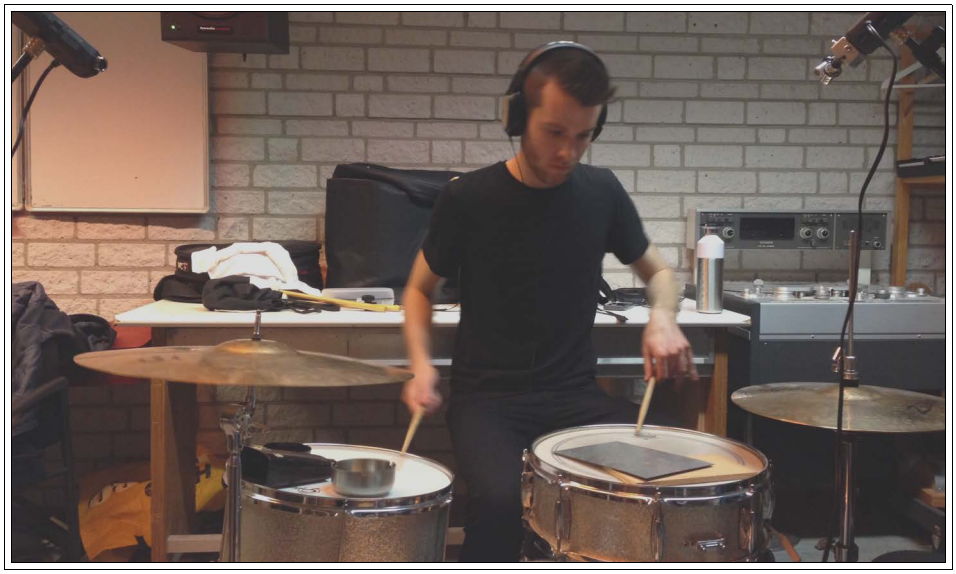

Figure 2: Dalton Danks improvising during the recording session in studio BEA 6. Photo taken by the author.

The piece is based on a 'dialogue' between the edited recorded performances of the drummer, the material taken from the 'feedback patch', and the transformations of both. Moreover, the improvisational playing of the drummer is also reflected to the gestural sonic character of the transformed material, which was most of the times achieved by manually controlling the playback speed of the tape machine (0:00-0:24, track No 1, accompanying CD). Besides speed alteration, I also took advantage of the Random Envelope Generator module (REG) to 'cut' material into short fragments and/or create random panning. Additionally, the EMT plate reverb of the analogue studio was also used at points to add spatial character to certain material (0:24-0:58, track No 1, accompanying CD). The listener's attention is directed to move between two kinds of performances, on the one side the recorded performances of the drummer, and on the other side the output of my own 'performance' using the studio. This 'dialogue' is evident throughout the piece but the most representative example can be found in the section from 1:25 to 2:33 (track No 1, accompanying CD). Here, I edited and combined the raw

material from the recordings of the drums and the 'feedback patch' in such a way to create timbral, rhythmic and gestural connections between them. The electronically generated sounds are put to follow, contrast or copy the phrases of the drums, creating a sense of continuity and 'liveness' as the material evolves in time.

Overall, the aim of this study piece was to experiment using simple techniques in a studio workflow very similar to those followed by a rock musician/producer in the late 1960s. By improvising with devices like the tape machine, the REG module and the mixing desk I created a 'studio performance' which interplayed with the recorded performance of a conventional instrument. Consequently, I believe that *Prog Study I* is an interesting experiment that shows how the notion of using the studio as an instrument could be approached from another perspective.

2. *Prog Study II* (2018)

Stereo

Continuing the conceptual idea of creating a study piece by using material taken mostly from one instrument, my next step was to use the electric guitar to produce my source material. Similar to the previous study piece, *Prog Study II* was the result of experimentations with studio techniques I was exploring during my research. In order to transform my material I used two kinds of techniques. The first one was a reconstruction of Terry Riley's tape loop setup and the second one was a patch that was creating collage-like structures by generating a random sequence of sound fragments.

As we saw in Chapter III, Riley's experiments with a long delay setup using two tape machines in Paris were very influential in the introduction of tape loops in rock music of the 1960s. Robert Fripp, founding member of King Crimson, used the exact same setup, named 'Frippertronics', in *(No Pussyfooting)* (1973), an album that came out of his collaboration with Brian Eno. Additionally, the technique can be also heard in Soft Machine's album

Figure 3: The tape loop setup using the two Studer tape machines in BEA 5. Photo taken by the author.

Third, probably introduced to the band by Daevid Allen who spent time with Riley in Paris in 1962 (Meyer et al 2014: 354). As we can see in Figure 3, I decided to make my own version of Riley's setup in order to create material that then would be combined together to form some sections of my piece. Compared to Riley's, the only difference in my setup would be the use of one long tape loop threaded to two tape machines instead of using two reels of tape. This was done to make sure that I will never run out of tape while experimenting. The other characteristics were identical: the first machine was switched to 'record-mode' and the second one to 'play-mode'. The signal passing from the play head of the second machine was fed to the record head of the first, creating a long feedback loop that played endlessly until the signal saturated. The initial material that was fed to this setup derived from recorded improvisations with the electric guitar where I mostly used an e-bow to create long sustained pitched sounds. With the decision to choose material with these kind of characteristics I intended to create dense harmonies made out of these sustained guitar sounds by using the two-tape setup. For example, the section from 2:10 to 4:09 (track No 2, accompanying CD) was created by superimposing material that came out of the two-tape setup and then transposed using the varispeed control. Leaving the tape loop to run for

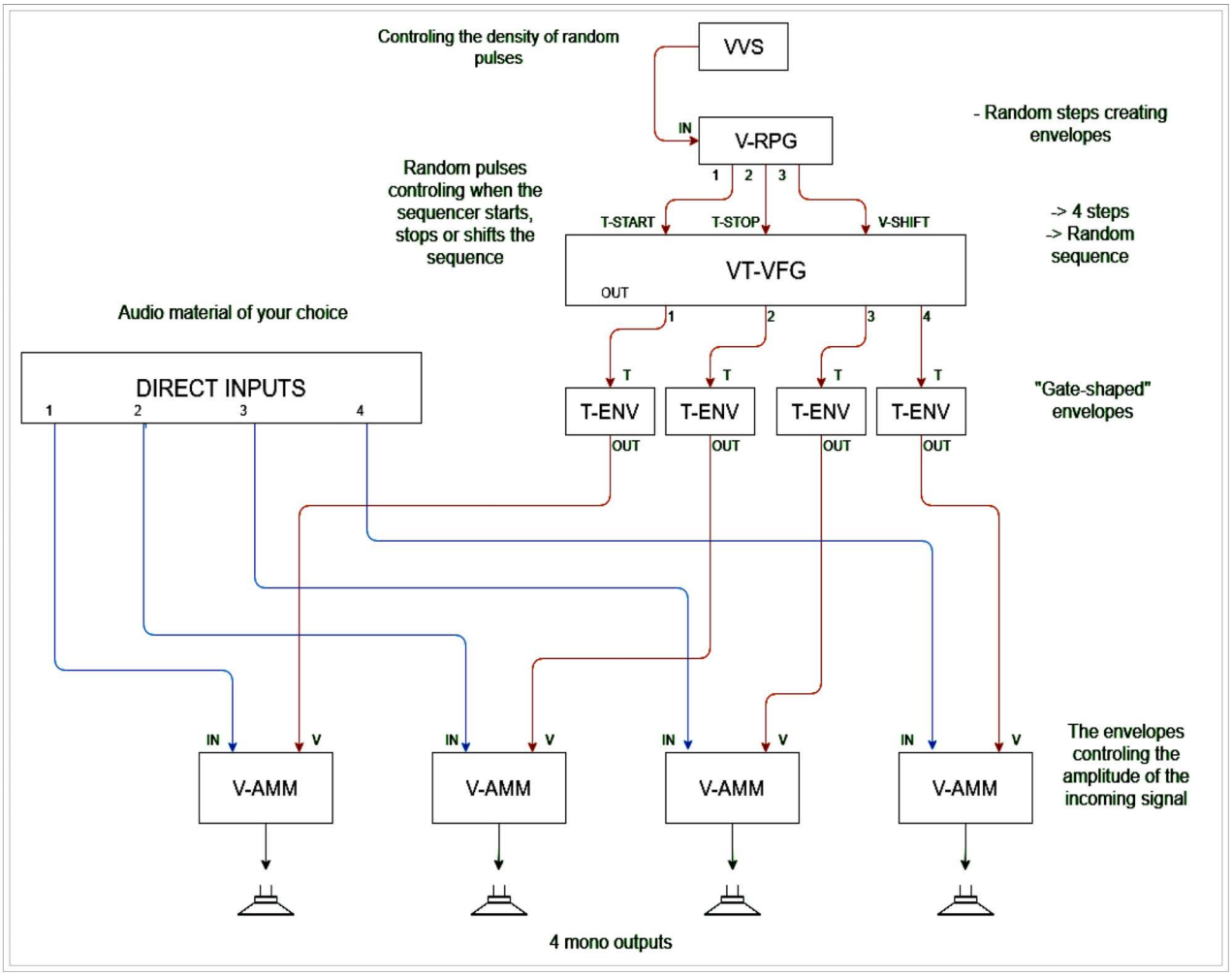

Figure 4: The patch designed to create sound collages where its fragments are triggered randomly.

quite some time and experimenting with the level of feedback created moments where the repetition of the loop is easily distinguishable, and on the other hand moments where the original material saturated so much that it became unrecognisable.

The other technique that I explored for this piece was inspired by the custom made device called “Apostolic Blurch Injector”, used by Frank Zappa to create sound collages in tracks like “Nasal Retentive Calliope Music” or “The Chrome Plated Megaphone Of Destiny” (see Chapter IV). Being fascinated by its output, I designed a patch in the analogue studio to create my own 'device' for generating similar sounding results (see Figure 4). The patch does not generate any sound but a process where each amplitude of the incoming signals is shaped by a separate randomly triggered envelope; resulting in a collage-like output. The sound material that the collages would

consist of is solely depended on the input signals that are fed into the patch. Moreover, what makes this patch 'feel' like an instrument while experimenting is the fact that some parameters like the shape of the envelopes and the density in which they are triggered can be manually controlled. With this feature I could create dense or sparse collages where the duration of each sound fragment could be adjusted while the patch was running.

For example, the last section of the piece (4:09-5:53, track No 2, accompanying CD), was created entirely by using the patch. The material I used to insert into the patch derived from previously recorded improvisations with the two-tape setup and the electric guitar, and a variety of sounds taken from leftover tapes I found in second-hand shops and the analogue studio. By adjusting the density and duration of the sound fragments in real time, I recorded several takes and then superimposed some parts of them to create the final result.

I believe that *Prog Study II* was an interesting experiment since I pushed myself to explore a limited amount of tools and techniques I created being inspired by certain examples from experimental and rock music. Although I think that the piece is compositionally 'weaker' compared to *Prog Study I* due to the lower sound quality, the exploratory way in which I interacted with the techniques to shape the sounds was a very important knowledge for me.

3. *Sonic Cartoons* (2019)

5-channel

This piece deals with the notion of how we listen to a recorded performance through technology and how different layers of manipulation affect our perception. The title of the piece is taken from Simon Zagorski-Thomas' book *The Musicology of Record Production* (2014) where he uses the term “sonic cartoon” referring to the schematic representation of recorded performance

which is created by all the types of manipulation that affect our understanding of recorded sound (Zagorski-Thomas 2014: 49-51). This concept fits well in the case of rock music, since being a recording art, it is constituted from a variety of recorded performances and their transformations through studio technology.

Sonic Cartoons aims to navigate the listener through a series of transformations where the process of production is described. The source material used for the piece was taken from a recording session with two saxophone improvisors, Laura Agnusdei and Riccardo Marogna. After listening to the recordings, I classified the material into two categories; one with clear melodic/tonal characteristics and one with more percussive/noisy elements. This categorization helped me decide the structure of the piece. As we can see in Figure 5, the piece is divided in three parts. For the first part, which is highlighted blue (0:00-1:31, track No 3, accompanying CD), I created a montage of material deriving from the recorded performances with

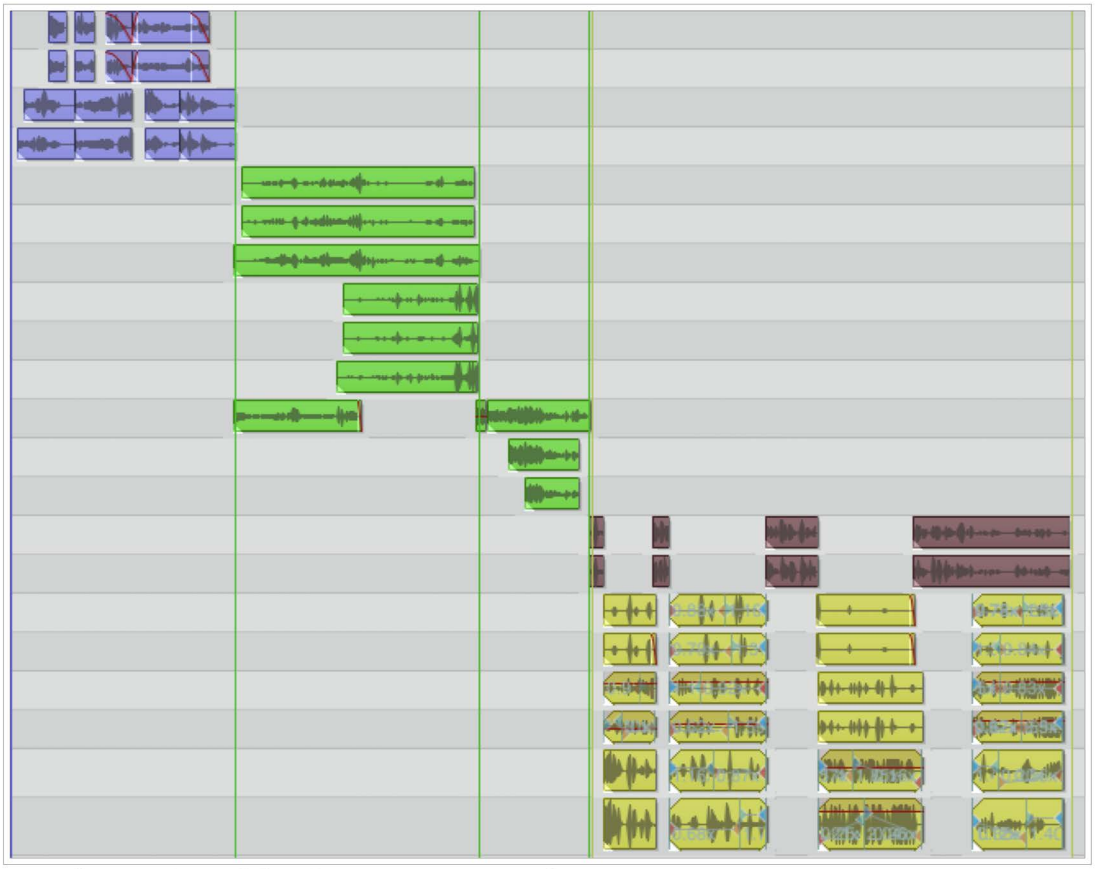

Figure 5: Overview of the piece's structure in the Reaper session.

melodic/tonal characteristics. In that way, I used the different sound fragments as building blocks to create a "composed performance" comprising rhythmic and melodic correlations that never happened during the recording. In the second part, which is highlighted green (1:31-4:00, track No 3, accompanying CD), I took entire takes consisting of percussive and noisy elements, and after I transposed them upwards, I superimposed them. Additionally, I experimented with the perception of space by applying a different reverb effect and spatial movement to each take. While in the first part the emphasis is given to the different combinations of recorded performances, in the second part the focus shifts to the timbral, gestural and spatial qualities of the sound material. The third part (4:00-7:22, track No 3, accompanying CD), is consisting of material deriving from the two above-mentioned categories which has been transformed even more compared to the previous parts. A "dialogue" takes place between a pitched-down saxophone line (brown tracks) and a collage of a variety of percussive and tonal material transposed upwards and downwards (yellow tracks). Due to heavy manipulation, the identity of the initial material is completely lost at some points, resulting in perceiving the material as abstract sound blocks or "sonic cartoons" as the title suggests.

Concluding, what is interesting about this study piece is that it creates a situation where I intend the listener to experience three states of transformation where the application of studio techniques becomes more and more prominent in the character of the sound. The saxophone material is getting gradually "destroyed" as more "studio performance" is applied to it.

4. *Studio Manoeuvres* (2019)

Besides the main title of this thesis, *Studio Manoeuvres* is also the title of the two-part fixed media piece which is intended to be presented in the final examination concert of the academic year. The two parts which form this

bigger composition, entitled *Colliding Takes* and *Tape Ornaments* respectively, are still unfinished as I write these words. However, my intention in this section is to explain the concept and compositional approach behind each part, and to attempt a brief description of their structure and the techniques I'm planning to use. Further, I describe all the steps I followed so far for this composition to be realised.

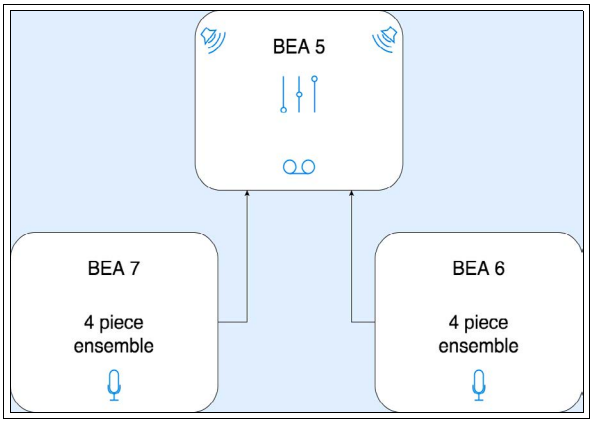

Figure 6: Schematic of how the BEA studios were connected through the online system.

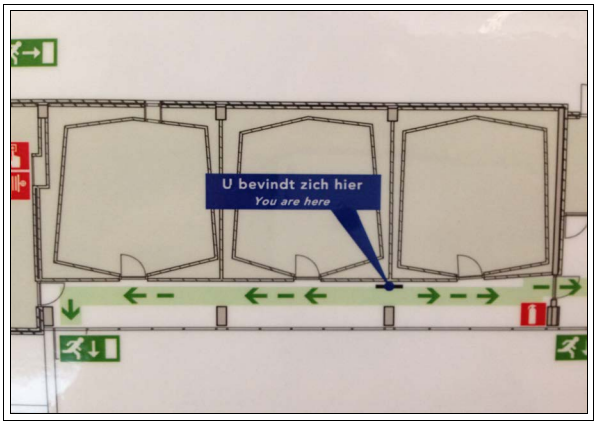

Figure 7: Photo of the emergency map showing the three studios. From left to right: BEA 7, BEA 6 and BEA 5.

The recording session

Being heavily influenced by the ways in which recording technology affected the conditions through which rock music was created in the studio, my initial idea was to create a situation where I could experience similar recording conditions. This idea led me to organize a not-so-ordinary recording session where two four-piece improvising ensembles were placed in two different studios with their signals being recorded and mixed in a third studio[52]. As shown in Figure 6, the signals from the studios BEA 7 and BEA 6 were sent to studio BEA 5 through the online system that connects the studios of the building. The interesting characteristic of this setup lies in the fact that the two ensembles were isolated from each other; meaning that each of them had no idea of what the other was playing during the recording. The third studio, BEA 5, functioned as the 'control-room' where I was responsible for recording

52 Marko Uzunovski and Chris Loupis's technical assistance in setting up the studios for the recording session was of vital importance.

and mixing in real-time. This condition, gave me, in turn, the opportunity to improvise with the musical output of the ensembles by using the mixing desk as an instrument.

As we can see in Figures 8, 9 and 10, I chose different instrumentation for each ensemble. The ensemble in BEA 6 consisted of acoustic instruments (vibraphone, double bass, flute, clarinet) coming in contrast to the more “electric” instrumentation of the ensemble in BEA 7 (electric guitar, saxophone, drums, electric bass). This allowed me to switch between or blend these two different sonic worlds easier while mixing. The instruments were close-miked in order to maximize isolation in the mix. Moreover, it is important to mention that due to the lack of phantom power the ensemble in BEA 7 had to use mostly dynamic microphones (with the exception of the 'overhead' microphone on the drums) while the ensemble in BEA 6 used only condenser ones. This created even more differences to the sonic character of each ensemble, something that was approached creatively during the live mix.

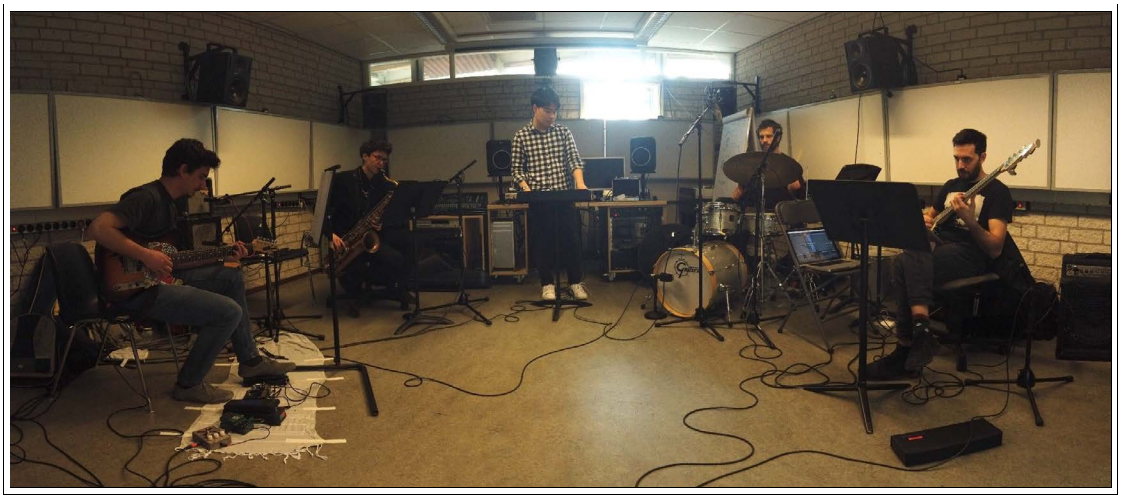

Figure 8: The "electric" ensemble with the conductor in BEA 7. From left to right: James Alexandropoulos-McEwan, Laura Agnusdei, Hibiki Mukai, Alexandre Coulon, Orestis Zafeiriou. Photo taken by Chris Loupis.

Figure 9: The "acoustic" ensemble with the conductor in BEA 6. From left to right: Tony Guarino, Annick Odom, Lauge Dideriksen, Irene Ruipérez Canales, Hilde Wollenstein. Photo taken by Chris Loupis.

Figure 10: Yannis Patoukas in BEA 5. Photo taken by Chris Loupis.

The score

The decision of what kind of material the ensembles would play, was a very crucial one. Instead of just letting them to improvise freely, I decided to create a score for conducted improvisation in which some aspects were left open to the choices of the performers and conductors. This allowed me to create a fixed structure where some of its internal characteristics would be shaped in real time and thus be different every time the score would be performed. The score (see Figure 11) comprised five playing modes[53] which were triggered by the conductors following a conducting scheme. As we can see in the score, each mode was constructed in such a way that its interpretation would result in a distinct musical outcome, which would be used as a 'building block' later during the editing process. In addition, as we can see in Figure 12, the two conductors were given to follow a horizontal time grid with fixed durations. The latin numbers inside each time slot corresponded to the playing modes that they had to trigger for the ensembles. In the cases where more than one numbers were indicated, the conductors were free to choose on the spot which playing mode they would like to trigger.

The form of the conducting scheme and the conductor's interpretation were responsible for defining the way in which all the playing modes would be organised in time. In Figure 13 we can see what path each conductor followed for each take during the recording session. This structural analysis played a very crucial role in the post-production and editing process, since it helped me assess the material and keep what sounded interesting. For example, the way in which the two ensembles improvised in mode 'I' during the first take in combination with how it was captured and mixed live by me (listen to the excerpt in track No 4 in the accompanying CD), created a moment where rhythmical, gestural and harmonic correlations occurred by chance in real time.

53 For a detailed description of how each mode functioned please see the score instructions in Appendix A.

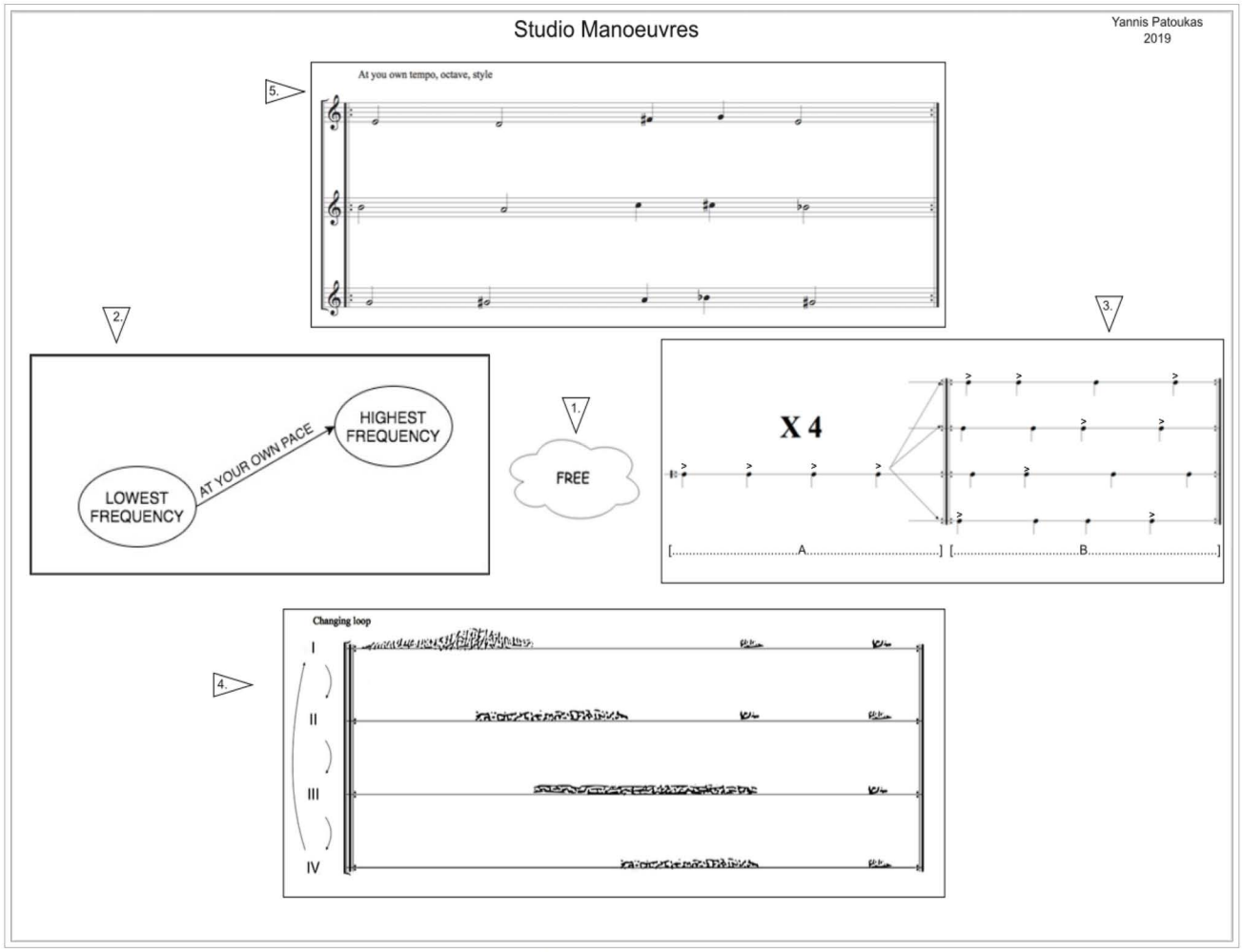

Figure 11: The score which the ensembles performed for the recording session.

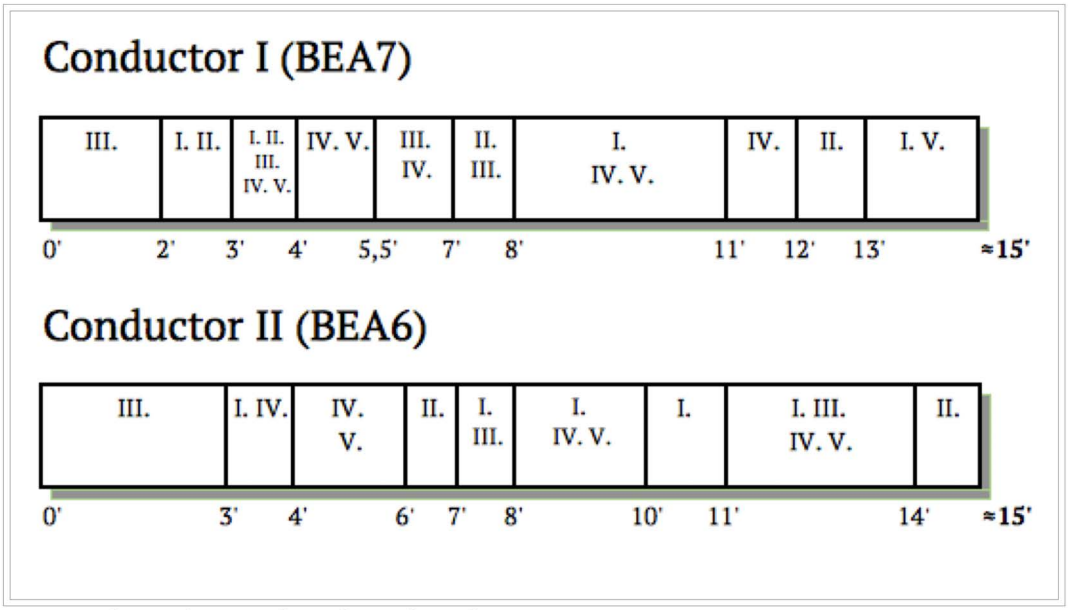

Figure 12: The conducting scheme for each conductor.

TAKE I

BEA 7 III → II → I → V → III → II → IV ----> IV → II → I

BEA 6 III -----> I → IV → II → I → V → I → IV -----> II

TAKE II

BEA 7 III → I → III → V → IV → II → I ----> IV → II → V

BEA 6 III -----> IV → V → II → I → I → I → V ------> II

TAKE III

BEA 7 III → I → II → V → IV → II → I -----> IV → II → I

BEA 6 III -----> IV → IV → II → I → V → I → III ------> II

Figure 13: The paths which each conductor followed for each take during the recording session.

By constructing the notations and an open structure, my aim was to create the conditions for the musicians to use their imagination in a way which would realise my musical objectives without determining precisely what they play. The different layers of indeterminacy – the two ensembles not hearing each other, the conductors being free to choose from a given number of modes and the fact that I didn't know exactly what kind of material will arrive to the "control-room" – resulted in an improvisation between the three studios.

However, this performance was created in order to be destroyed and not represented. Despite the fact that the real-time realisation of the score and how it was captured was a very interesting experiment by itself, its purpose was not to be presented as a composition but to give me access to musical material whose unique characteristics couldn't be found using another method. Consequently, the materials derived from the recording session were archetypal and functioned as a "scaffolding" for my compositional ideas to be build in. In this way, when the final composition would be realised, it would comprise all the individual elements which made its primary form in the first place. Concluding, I must mention that besides its obvious connection with Cage's work, this compositional procedure also connects conceptually with the ways in which some rock artists approached their creative practice in the studio. For example, like Zappa's use of the xenochrony technique which results in a product largely based on chance (see Chapter IV) or like the improvisational way in which the Beatles' sound collage "Revolution #9" was put together (see chapter II).

Colliding Takes* and *Tape Ornaments

As mentioned earlier, a big amount of the material derived from the recording session with the ensembles is to be used for the creation of two fixed media pieces, *Colliding Takes* and *Tape Ornaments*, together forming a two-part bigger composition, *Studio Manoeuvres*.

The two pieces are yet to be finalized, however I would like to briefly point out my intentions regarding the compositional approach I will follow for each one of them. For *Colliding Takes* I'm planning to use a "montage" technique where raw material taken from the three recorded takes will be slightly transformed, edited, moved around and recombined, in a similar manner of the one followed by Miles Davis and Teo Macero (see Chapter I), to create a new composition. Additionally, for the second piece, *Tape Ornaments,* I will attempt to explore the creative possibilities of some of the

techniques I've been talking about in the previous theoretical research. While the focus in the first piece will be in the editing process of recorded performances, the second piece will be based on a series of sound transformations deriving from the limitations of certain production techniques. Whether my intentions will be fully realised in the pieces, we will have to wait and see.

-Epilogue-

The purpose of this research was to investigate different crossovers between the experimental rock music of the late 1960s and early 1970s and the field of electroacoustic music, especially in terms of production techniques and aesthetic approaches. Moreover, a part of this research dealt with the creative exploration of the production techniques used in rock music for the sake of developing my own compositional work.

By investigating some musical examples in the field of experimental rock we saw how some musicians went beyond the mere documentation of a performance to using the recording studio and its technologies to create new aesthetics and expand the rock sound. As pointed out in Chapters II, III and IV, this shift happened, partly, by introducing production techniques inspired by avant-garde or experimental electroacoustic composers to their creative practice. It also happened, as addressed in Chapter I, due to rock's social and technological context, which created an “all-embracing” character which was open to any possible aesthetic transformation.

Furthermore, one of the aims of this research was also to explore creatively the studio techniques being studied in the theoretical part. Thus, in Chapter V, I attempted to explain how all of this knowledge deriving from the study of certain techniques was put into practice. For me the most interesting results were achieved by putting myself in a situation to work with the limitations that the analogue technology offered but at the same time being able to escape from them when the music was asking for it. By raising questions on how experimental rock music is organized differently, helped me explore a set of tools and rules to compose music using technologies that were new to me.

Concluding, I strongly believe that this thesis attempts to create a framework where a discussion about composing electroacoustic music from

the perspective of rock production (and vice-versa!) could emerge. Therefore, I don't see this thesis as an end product but as a step for further creative musical exploration and research.

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-Appendix A-

Studio Manoeuvres

-score instructions-

The score of *Studio Manoeuvres* consists of five playing modes:

[1.] Free improvisation / not necessarily playing continuously / allow silences to occur / think about connections with previous events.

[2.] Start playing from the lowest frequencies of your instrument and reach the highest frequencies at your own pace. Frequency is not necessarily related to pitch. The lowest frequencies of a drumkit for example could possibly emerge from the kick drum – the highest frequencies of a flute could possibly be the clicking sounds of the keys and so on.

[3.] This playing mode consists of two parts, A and B:

- Part A is a loop of four repetitions. The quarter notes must be performed in unison, with a very sharp attack and short duration. After the four repetitions of part A the player must move to part B.
- In part B, the player is free to choose one of the four rhythmical loops. The rhythmical patterns are freely written so the interpretation is up to the performer – however the player should try to follow the dynamics as indicated above each note (“>”). The player is free to remain on a certain loop or jump to other loops during the performance.

[4.] This playing mode consists of a continuously changing loop. Each number corresponds to a player. With each repetition of the loop the players swap positions as indicated by the arrows. This playing mode demands concentration and visual communication between the players. When the

playing mode is triggered player “I” starts playing by following the graphic score. Player “II” enters when player “I” reaches a climax. Player “III” enters when player “I” stops. Player “IV” enters when player “II” stops. Players “III” and “IV” stop when players “I” and “II” decide to enter for a brief moment after communicating with each other. The loop ends with all the players entering together for a short moment after coordination.

[5.] This playing mode consists of a loop of three melodic patterns. Each player starts by choosing a melodic pattern. Non-pitched instruments can focus on the rhythm of the melody. After playing their first choice once, the players are free to change between melodic patterns as they please. The players are free to perform the melodic patterns at their own tempo, octave and style.

-Appendix B-

Contents of the accompanying CD

Track 1 – *Prog Study I*

Track 2 – *Prog Study II*

Track 3 – *Sonic Cartoons*

Track 4 – *Recording Session_Take 1 (excerpt)*