

Organic Tempo

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ORGANIC

OVERDUBBING

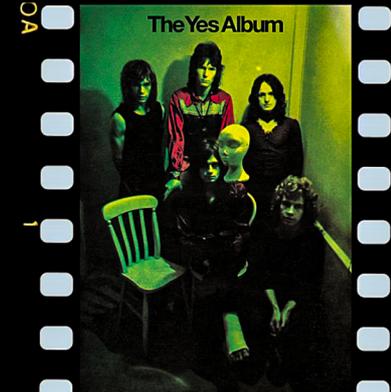
TEMPO - MONITORING & INTERACTION THROUGH TIME

Masters Project A2

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2020



Word Count: 8000



Percussion

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Abstract

In this study I experimented with different methods of synchronising consecutive takes when recording in a non-synchronous way through overdubbing. This included both conventional and unconventional methods. Next to this, workflows for free time overdubbing were also explored. Self-developed monitoring methods, collectively dubbed as the 'Nedmoot' method, that were proposed and developed during preceding research stages, were also brought into practice. The primary motivation was to facilitate a closer approximation of 1970s Rock aesthetics, the attainment of which normal overdubbing methods can complicate, or compromise entirely. Notwithstanding, other personal and general motivations were also considered, including; Tinnitus Related Issues, Long Distance Collaboration, and Performer Enjoyment. To collect data, a reflexive auto-ethnographic approach was employed, using practice as research; herein capturing data through written notes, video documentation, and audio recordings. This meant that next to reviewing data from a 'performer perspective' in-moment, a more distanced re-evaluation of processes and results from a 'producer perspective' was possible. In addition to the practical research, an interview with an industry expert was also conducted to outline important elements of 1970s recording practices. Focusing on how these can influence performance and therein the overall sonic qualities of recorded music. The track '*Starship Trooper*' by Yes (1971) served as a vessel for experimentation and provided context, which allowed for approaches to be compared to each other, as well as to the original recording. A conclusion was reached regarding the efficacy of different methods in the context of this study, as well as a more general setting. Next to this, improvements were suggested, and the practicalities of methods in relation to the necessary time investment were considered. Lastly, directions for future research in this area were suggested, based on the data that was procured.

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Introduction

Motivation

Having been confronted with the, at times, negative characteristics that contemporary studio practices can impart on recordings¹ as a musician and producer, I developed an interest in improving aspects of the recording process. Afforded by the same technology that is in part to blame for these 'side effects', this project sought to develop novel ways of working in the studio for one-man-bands, or long distance collaborative projects. Herein investigating how elements of 'organic' live group recordings can be replicated when recording in a non-linear fashion is the only possibility, or desired way of working. This was done with the aim of obtaining a more 'organic' performance sound, which can contribute to a higher degree of authenticity depending on the goal aesthetic, being 1970s studio recordings (Rock) in this instance (Danielsen & Zagorski-Thomas, 2010). Admittedly the term 'organic' might seem vague, as it is difficult to convey the characteristics of sound through language, seeing it often depends on tacit knowledge (Porcello, 2004). Moreover, studio recordings, especially from the selected decade, are highly constructed at not in the slightest realistic representations of natural performances (Gracyk, 1996). Notwithstanding, they were often constructed from recordings that did indeed feature ensembles tracking synchronously within the same space, after which additional overdubs or editing took place. Therefore they still have a sound that I describe as 'organic', featuring the innate rhythm, tempo, and interaction of a group performance, including the 'discrepancies' that are inherently imparted and add character (Keil & Feld, 2005).

Inspiration & Goals

This area in the field of record production hasn't been as extensively researched as some other subjects, at least not within academic publications that I'm privy to. Nonetheless, one study that is directly relatable: '*Creating A Rubato Layer Cake*' (Capulet & Zagorski-Thomas, 2017), both introduced and indirectly led me to important ideas and greater theories. These include: '*The Ecological Approach to Perception*' (Clarke, 2005; Gaver, 1993; Gibson, 1979), Actor Network Theory (Latour, 2005), Spectromorphology (Smalley, 1997), and ideas related to the evaluation and consumption of music (Bourdieu, 1993; Moore, 2002). Using the aforementioned theories, I attempted to dissect and replicate the sensory experience of a group performance, as well certain communicative and interactive elements, leading to the development of the 'Nedmoot' method². In addition to this, different methods for synchronising non-linear recordings were also experimented with, ranging from contemporary click recording to overdubbing completely in 'free time'³.

¹ In particular the lack of agency between overdubs that were recorded, seeing the performer isn't able to adjust their performance to something that hasn't been recorded yet. Additionally the negative influence of click track based recording on certain music, depending on the goal aesthetic, due to its influence, the lack of interaction, and absence from the final product (Zagorski-Thomas, 2014).

² A term referring to a combination of monitoring methods outlined in the A1 Project Proposal (see **Appendix B1**). It seemed appropriate to use my name as a summarising term, despite the technique being based on existing ideas, similar to e.g. Brauerizing, Glyn John, Blumlein etc.

³ Meaning 'Rubato' in classical terms.

It is important to mention is that the recorded examples included in this study were not mixed & mastered, given this was not the focus of the research.

All of the aforementioned was elaborated on in greater detail in the preceding A1 Project Proposal (**Appendix A1**).

Developments & Adaptations

Before delving into the project, it must be elucidated why the methodology was altered from the one outlined in my A1 proposal, and how this was done appropriately. During the period this project was conceived and planned, Covid-19 infections were at a stable level, and restrictions were being eased throughout Europe. Unfortunately, this started changing by the time the practical stage of this project had commenced. Due to reinstated travel restrictions and quarantine measures, the ensemble that had agreed to participate in the experiments wasn't able to proceed; meaning both the experiments and other activities planned outside the scope of this project were cancelled.

After careful consideration, I decided to use one of the suggested escape routes from my A1 proposal as an alternative, seeing I had accounted for circumstances in which recording a band was not possible. Therefore I elected to use an existing recording from of the 'goal aesthetic' time period, namely '*Starship Trooper*' by Yes (1971), which served as a baseline organic studio performance⁴.

Of course any song from the selected decade could have been used, but the following considerations led to the selection of this track:

- I had previously endeavoured to record this track as a one-man-band using conventional methods, herein failing to approximate the desired aesthetic result, which I believe was in large part due to the use of contemporary overdubbing methods⁵ (see **Appendix C1 & C2**).
- It is a highly dynamic track with a constantly changing arrangement, incorporating different styles, timbres, rhythms, and meters. Herein it provides a wider variety of data than a more constant formatted song, in reality being made up of three different shorter pieces 1. *Life Seeker*, 2. *Disillusion* & 3. *Würm*.
- Interviews and other publications provide detailed information regarding the recording of the original track, allowing for informed decision-making in my approaches to re-recording it, and a detailed comparison of results.

⁴ In this instance a recording for which the base is recorded by and ensemble performing simultaneously within the same space, after which additional overdubs were added and elaborate editing took place (Anderson, 2020).

⁵ In this instance referring to the use of templates with constant tempi (although occasionally automated to change), and click tracks when creating a recording/performance solely through overdubbing, in order to keep all overdubs in sync and provide a common/constant reference.

- Being an avid Yes fan, in particular of their 1970s repertoire, successfully creating a cover of one of their songs is something I have always wanted to do. This was important in relation to motivation, seeing all parts had to be copied and approximated in order to record them, which was very time consuming.
- I had access to the original stems of the recording, making transcription, analyses, tempo mapping, and comparison easier.

Obstacles

Although I had initially planned to record different versions of the track in its entirety, having relearnt the entire arrangement on drums, bass, guitar, and keys, this proved to be more work than I had foreseen. For the most part this was attributable to my own excitement, which clouded my ability to make realistic judgements, although unexpected and reoccurring issues⁶ also hindered progress. Moreover, given the inductive nature of this study, new additions and deviations were incorporated based on interim results, also adding to the workload. Fortunately, I ascertained that it wasn't necessary to record the full instrumentation for each version, as by playing along on guitar or bass it already became apparent what was and wasn't working. Therefore, only drums and subsequent bass overdubs were recorded, herein avoiding superfluous effort. At the end the most successful version was selected for use in the experiment with the *Nedmoot* method, by comparing a version that was overdubbed with regular monitoring methods versus one that was recorded with the *Nedmoot* method applied. Lastly, although being a valid topic within the larger research area, the 'digital restrictions' that were proposed in the A1 proposal were not tested, and were shelved for future research. Similarly, due to technical difficulties⁷, the VR aspect of the original proposal was replaced by projections and holograms, meaning the interactivity interface⁸ was also abandoned in order to facilitate live size projections (view [Appendix A2](#)).

⁶ Issues such as: failing cameras (responsible for many incomplete takes), daw CPU errors, video MTC syncing difficulties given the limitations of DAWs to play one video at a time, and having to develop alternative methods for these technical roadblocks.

⁷ Using 360 footage in combination with VR glasses to monitor performances proved to be impossible due to issues in relation to syncing with a DAW and latency. Additionally inherent incompatibility issues between VR headsets, software, and Macs didn't allow me to use the majority of headsets with my computer.

⁸ That was developed as part of the A1 proposal, see [Appendix A3](#).

Contemporary Version

This version was included to serve as a 'control', allowing for other versions to be compared to it, seeing I had previously concluded this approach didn't translate the feeling of the original track sufficiently (**Appendix C1 & C2**). Notwithstanding, given I now examined the performance and results in a research context, it did allow me to outline clear differences and shortcoming between this version and the original recording. Having said that, it was by no means constructed to fail, incorporating tempi changes⁹ based on the original track and a guitar scratch track for context.

(See **Appendix D1** for a table with details of all recorded versions.)

Tinnitus

Despite wearing dampening headphones, 'transient rapid onset tinnitus'¹⁰, has always tended to temporarily aggravate my pre-existing (mild) tinnitus for a longer period afterwards. Although changing the sound by low-passing the click at 10K lessened the effect somewhat, it remained an issue throughout the recording process, seeing I personally require the click track to be relatively loud in order for it to be audible due to the loudness of a drum kit. Not surprisingly, the general sense of discomfort caused by this phenomenon undoubtedly also had a negative effect on the quality of my performance.

Playing 'Around' the Click

As playing 'around' the click can help give a drum recording a more natural feel (Marshall, 2014), I attempted to play the parts in between the strong beats in a 'looser' way, whilst keeping my right hand (in charge of the hi-hat and ride) in sync with the click as much as possible. A good analogy would be choosing what colours are used freely, but still trying to colour within the lines. Unfortunately, this was quite difficult to do, likely attributable to the particular tempo of the track (approximately 80 BPM), seeing discrepancies are more apparent at lower tempi, making it difficult to play 'in time' yet 'loose' (Rasch, 1981). Next to this, the verses of the original track lack a clear continuous backbeat that incorporates constant crotches or quavers on the cymbals, which De Haas (2007) indicates is where the 'systematic irregularities' occur that capture the majority of expressive timing. Herein he suggests it might indeed be difficult to attain a more 'loose' feel for this track in particular, given its odd, inconsistent patterns. Moreover, click tracks often tend to accent the very same crotches and quavers that cymbals do, making it even more difficult to deviate from them, unlike when 'pushing' and 'pulling' rhythmic content that sits in-between the audible clicks.

⁹ Not constantly fluctuating but still changing in a subtler manner depending on the section (See **Appendix C3**).

¹⁰ An instant onset of tinnitus after exposure to loud sounds, see Snow (2004) for an in depth description.

Breath & Tempo Changes

Upon reviewing the recorded drums and playing along on bass¹¹, the main issue that I encountered was a lack of 'breath' compared to the original recording, by which I'm referring to subtle tempi changes and pauses. A good example of this is verse 1, where between the cymbal stabs, snare embellishments, and short beats, the drums do not showcase the same sense of tempo dynamics (see **Appendix C4**). Similarly, when fills happen, they seem to not speed up, or slow down, resulting in a somewhat 'flat' feeling (see **Appendix C5**). Because 'fake tempo' changes can occur due to a change in the perception of tempo¹² and not an actual increase (Fernández-Sotos et al., 2016), it seems like the syncopated drum section in the outro speeds up when it starts. When examining **Appendix C6**, it is clearly audible that temporary tempo decrease compensates for this psychoacoustic phenomenon, herein giving the perception of a more constant tempo.

Organic Tempo Version

Playing along, or to?

The first thing that was clearly noticeable upon tracking drums for this version was the increased sense of playing 'along', rather than playing 'to' I experienced. This allowed me to focus more on 'playing the song', rather than focusing overly on 'playing in time' with the click. Most likely, the less clinical sounding percussion, which also provided a rhythmic reference in-between the crotchets that are normally accented by a click, allowed me to play along more easily, including with a 'looser' feel, not feeling as controlled by the grid. This is clearly visible from my overall demeanour when comparing it to the regular click based version (**Appendix C7**). Of course, seeing the tempo changes were directly copied from the original track¹³, this is in part because the original inherently 'breathes' more, allowing for more natural pauses, delays, and pushes (**Appendix C5**). Lastly, the extra rhythmic context meant I didn't require the percussion to be as loud in my headphones compared to a click, seeing it provided a constant stream of rhythmical reference.

Scratch the Scratch Track

Because the organic tempo was derived from the original recording, I was able to use the track itself as a scratch track¹⁴. Not only did this provide better natural cues, not requiring me to look at markers or to focus on pre-recorded voice cues¹⁵, but it also helped me to better gauge dynamic levels of parts and sections. This resulted in more dynamic differences

¹¹ I played along to see what takes and sections worked best, and didn't record it at this point yet. I found this was a good way of determining the quality of a take, as without context it's difficult to tell if something works by solely listening to the performance and the click/scratch track.

¹² Including as a result of changes in the subdivision of rhythmic parts.

¹³ Using Logic's Tempo Adapt feature, with some manual corrections (mainly to indicate the constant meter changes).

¹⁴ Because I had access to the master stems of the original recording I could play along to a version with no drums.

¹⁵ A scratch track doesn't always provide clear enough information in relation to the structure and upcoming transitions

between sections, and therefore communicated the musical intent better towards the listener compared to the baseline version, seeing the type of energy, emotions, and gestures associated with sounds are influential (Smalley, 1996). When examining a comparison of waveforms from the playlist of the organic version vs. the contemporary version, this is clearly visible (**Appendix C8**). In addition, monitoring the full track also helped me with following the organic tempo changes, as without it, the tempo changes of the isolated percussion felt a bit odd, despite being easy to follow. Of course, in a setting where an original song is being recorded, there usually isn't a pre-existing studio recording, but rehearsal recordings could be used to the same effect as the original track was here.

Improvisation

Although my drum performances were based on the original parts by Bruford (1971), I did not play everything exactly the same, and instead improvised certain embellishments and patterns. Upon reviewing the organic version, it became apparent that I had changed the tom pattern from what I played in the contemporary version, suggesting the percussion might be more inviting for highlighting certain rhythmic accents. When comparing these patterns (see **Appendix C9**), it becomes clear that the contemporary version pattern feels more out of place and less fluent. Perhaps the click made it sound appropriate to play the pattern in question, seeing it provides a more absolute framework to position hits, even though it doesn't work as well in context. Notwithstanding, the fact that I used the original recording as scratch track could have influenced the patterns equally, but it is nonetheless an interesting difference.

More Layers

Upon attempting to record bass over the drums¹⁶ it became apparent that something wasn't working. Although it wasn't impossible to synchronise with the recording, I had to focus on the waveforms in order to do so. Albeit that the naturally fluctuating tempo is very effective in the original recording, it simply felt unnatural to me. Examples of what I found to be 'awkward' timing wise can be found in **Appendix C10**, where stabs, hits, or transitions take place unexpectedly early or late, at least compared to what I anticipated as bassist. In hindsight this is not very surprising, given the fact that the actors (musicians in this case), who were part of a network (being Yes in the studio) experienced 'agency' as their interactions were mutually influential in steering the performance (Latour, 2005). Within such a network, 'feedback' is critical for substantiating the interaction (Sawyer, 2007). Next to this, all of the actors involved have a unique individual 'time feel'¹⁷ (Keil & Feld, 2005). Herein the aforementioned facts suggest that, as outsider who wasn't part of the original

¹⁶ As is mentioned in **Appendix D2**, I decided to mute the percussion, limiting its influence as 'temporary' invisible actor in the network. This was done because 'mistakes' that are only apparent in context with the percussion/click needn't be corrected if the recording sounds and feels good when playing along with these muted.

¹⁷ A good example is Steve Howe's 'laid back' feel, in particular noticeable live, which he uses to purposefully create time-based tension as part of his style (See **Appendix C13**).

feedback cycle of the performance¹⁸, it is difficult to follow and understand the organic tempo map, which was substantiated through group interaction. Perhaps if I had been a part of the original performance¹⁹ it might have been easier to follow along, and more importantly would have felt more natural.

Free Time Version

Difficulties

As I originally planned²⁰, I attempted to record the free time version using no scratch track, or any other form of reference. Unfortunately, given the arrangement, its length, and complexity, this proved to be more difficult than I had anticipated. Although an organically variable tempo is considered positive, it was difficult to keep a relatively constant tempo²¹, as I kept speeding up. Next to this, it was difficult to keep track of the number of bars per section, as well as the when the meter changes happened. Because there was no grid, visual or pre-recorded voice cues weren't an option. For this reason I attempted to record a free time guitar scratch track²², to provide more context, including additional percussiveness, such as 'muted scratches' (see **Appendix C11**). This was indeed helpful for keeping track of the structure, but the same issues in relation to speeding up (to the extent where it had a negative impact on the quality of the recordings), occurred. This was due to my own inability to keep a satisfactory sense of time for the duration of the song, despite recording the scratch track in sections. I wrestled in an attempt to play more consistently, which was most difficult in sections that lacked a constant backbeat. For instance in the verse, the drums are part of a 'call and answer' type relationship (**Appendix C12**), which given the lack of 'call' (seeing there was nothing being monitored) was incredibly difficult to make feel right. The sections that did incorporate more constant beats (chorus, pre-chorus, & outro), were easier to play well, and were not as difficult to follow upon recording consecutive overdubs (bass & guitar), most likely due to a guiding stream of quavers on the hi-hat and ride. Eventually I surrendered, seeing that recording a free time version, alone, evidently couldn't realistically be done this way. The lack of the aforementioned 'feedback cycle' that agents are normally a part of was probably to blame, seeing it functions as a 'rubber band' in which performers keep each other in check. Notwithstanding, my skill level as drummer undoubtedly also negatively impacted results, because I don't have a sufficiently internalised 'metronome sense' (Waterman, 1948). This could be due to preconditioning from recording with a click often (Gwilliams, 2009; Danielsen & Zagorski-Thomas, 2010). It must also be acknowledged that this particular song, given its length and complexity was perhaps too much to take on. Especially when considering that the original featured Bill Bruford, who is widely considered to be one of the greatest drummers of all

¹⁸ Body language, eye contact etc., wasn't recorded, only the sound, making it impossible to understand what was happening at the time perfectly.

¹⁹ Such as when recording an original song by a band/ensemble that I have been a part of for a longer time, either alone or through long distance collaboration.

²⁰ Based on the results of my research methods A2 experiments²⁰ (see **Appendix A3**).

²¹ Meaning a tempo that is variable yet constant within a certain tempo bandwidth (for instance ranging from 78-81).

²² This meant deviating from the results of the Research Methods A2 experiments, seeing the context then was a short riff, not a full arrangement, and it was not possible to complete it this way.

time, whilst I am of an intermediate level at best. Notwithstanding, this did suggest that some music might be more suitable for recording in free time as a one-man-band, in particular for more skilled players.

'Lego' & The 'Unreal' Performance

Because I was determined to create some form of free time recording, I decided to change my approach. Herein I 'constructed' a free time performance, rather than recording one in a single, or a few synchronous takes, which I coined as a 'Lego approach' in my original notes. To do this I recorded all sections of the song separately multiple times, including transitions, and then built a performance by selecting the best takes and editing the 'blocks' together. Next to this, I used Elastic Audio²³, for the most part not to correct timing, but rather to stretch sections over a greater length to create the right approximate tempo, whilst preserving the relative timing. De Haas (2007) suggests that "timing does not scale proportionally with tempo", but considering my edits didn't drastically change the tempo²⁴, I personally didn't notice any negative effects. In doing this I realised there exists a strange contrast between going to great lengths in order to make a recording sound more like an authentic 'real' group performance, and herein extensively using digital tools and editing in the construction of an 'unreal' performance. Zagorski-Thomas (2010) states there is not a clear line indicating where 'machine time ends and human time starts', seeing that today both are equally dependent on digital tools, and that our notions of what digital productions sound like stem from aesthetics, not the technology used. When it comes to aesthetic values of Rock, live performance can serve a validation tool for the audience (Auslander, 1998). Perhaps the extensive effort that goes into, what is essentially 're-performing, and re-composing, could serve a similar purpose for the audience, although admittedly editing isn't particularly Rock 'n Roll. Regardless, for the purposes of this project an authentic sound was more important than confirming to authentic studio practice in relation to aesthetic guidelines. Therewithal, despite the fact that I attempted to simulate the sound of an organic group performance, I am recording everything alone, and was in that sense arguably disqualified from an authenticity perspective from the start. Moore (2002) indicates that the "appropriation of sonic experiences by perceivers remains foundational to processes of authentication", and that 'Authenticity is ascribed to, rather than inscribed in', suggesting an organic sound that was achieved inorganically can still be appreciated. A good example is Bitches Brew (1972), which was heavily edited and constructed, herein not true to the core aesthetic values of Jazz, yet accepted by the audience and revered as one of the greatest achievements in music history.

²³ A tool found in Pro Tools that can be used to edit, stretch, and change the timing of recordings.

²⁴ Limited to ensuring sections didn't speed up by more than a few BPM over a longer section and duration.

Monitoring

Due to the absence of headphones, as no click or scratch track was monitored, the level of expressive control over dynamics and timbre were experienced as being greater. A good example of this are the snare parts in verse 1 (see **Appendix C14**), which generally sound more dynamic when compared to the other versions, showcasing greater timbral control.

The Nedmoot Method

Ultimate Version

Although I had initially planned to apply the *Nedmoot* monitoring method to the most successful version, none of the attempted methods produced a result that was deemed sufficiently satisfactory. However, they did provide clear data as to what elements of each version worked best, or didn't work at all. Therefore I decided to create an 'ultimate' version that was informed by the lessons learnt from the prior experiments, and thereafter test the *Nedmoot* method using that version. This meant the effort wouldn't be wasted, as the end result would be good enough to allow for completion (albeit at a later point outside the scope of this project).

Herein I created an 'ultimate' template that incorporated more subtle tempo changes in order to accommodate 'breathing' in the playing, as well as tempo changes that take place over longer sections²⁵. Based both on the organic tempo track, as well as the contemporary click-based map. However, not every detail was directly based on the original track, as I discovered that what felt right to me was more important in creating a tempo map I could play along to without feeling confined or controlled. An example of this is the tempo decrease that takes place in the chorus between the two chorus sections, which slows down by a few BPM momentarily (**Appendix C15**). Although finishing the complete track falls outside the scope of this project, when *Disillusion* will be recorded at a later point, this will be done in free time. Herein a combination of all three approaches will eventually make up the final recording. Given the positive results, percussion was used as a click and the original track was stretched to fit onto the template using Elastic Audio, providing the ultimate cue track with dynamic context.

²⁵ Similar to how a band might speed up in the pre-chorus to finally achieve the desired tempo when the chorus starts.

Nedmoot Monitoring vs. Regular Monitoring

(For a full description and technical overview of the *Nedmoot* method, see **Appendix B1**)

Compared to regular monitoring²⁶, the holograms provided a heightened sense of engagement and communication with the previously recorded takes, albeit mostly one-way. In part thanks to the cues provided by the physical body language and re-affirming gestures of the performers that matched the audible sound (Smalley, 1996). Admittedly, in particular for the drum recording²⁷, the facial expressions of my past selves were somewhat 'flat', due to the fact that the projection and reamping cycle has to start somewhere, which meant the first layers had nothing to look at. The guitar recording did look at the drummer, seeing the drums were indeed present when it was recorded. Notwithstanding, non of my past selves made clear eye contact with the last overdub that was attempted (bass), as nothing was present in that position at the time they were recorded, making me feel somewhat ignored. Herein, although it was engaging to look at the other (past) actors, a real sense of mutual influence, interaction, and thus agency, was still absent.

However, the act of standing up and performing as if playing with a group did make the process more enjoyable and engaging overall, evident from body language and movement (see **Appendix C16**) when compared to other versions. Next to this, because I was in a 'performative' mindset, I didn't pay as much attention to the fact that I was recording, whereas with the regular version I was too focused on playing perfectly. A good example is a section where I go straight to editing the recorded part after finishing, being solely occupied with a 'task', rather than 'performance' (see **Appendix C16**). In this sense the sensation of performance was very freeing, and made the process genuinely enjoyable, seeing I had never played with past versions of my self before in the same way. Perhaps this could also be a good tool for encouraging 'character' mistakes, given the aforementioned absence of personal scrutiny, resulting in more acceptance of imperfection.

With regards to the sonic experience, the loud source monitoring resulted in increased dynamics for the recorded guitar, most likely attributable to feedback and 'power sagging'²⁸. In addition the loud volume seemed to allow me to perform freely without inhibitions, at least compared to when using regular monitoring.

The spatial nature of the sound sources, being 'functionally staged' for the sake of simulating a performance, indeed provided a realistic representation (**Appendix B**). This was because 'textures' and sounds could be directed back to their sources, being the guitar amp, as well as the reamped drums (Smalley, 1996; Zagorski-Thomas, 2010). Especially in combination with the life-size projections, again increasing overall performativity, seeing one 'acts to what's going on around' (Clarke, 2005; Shechner, 2002).

²⁶ Meaning using headphones or studio monitors whilst overdubbing, with the performer usually sitting in the control room for this.

²⁷ Because the drums were recorded first, having no visual or auditory reference at all.

²⁸ An inherent trait of a valve amplifier, meaning loud, or large transients can make the amp behave dynamically by dropping in volume momentarily.

Overall, when comparing snippets of the versions, albeit the *Nedmoot* version sounds a bit 'looser' (see **Appendix C18**), it doesn't sound strikingly more like a group performance²⁹. Most likely this is attributable to a lack of overall interaction, although it's important to consider that the aforementioned absence of different musical personalities could be in part to blame as well, seeing my performance consisted of clones of a singular character (Monson, 1996; Keil & Feld, 2005). Even if 'true interaction' somehow was able to occur, any layer with the exception of the final one, still wouldn't be able to benefit from the full context of the arrangement like in a synchronic recording (Zagorski-Thomas, 2014). Next to this, the feedback that happens when monitoring a pre-recorded part is one directional, not a cycle, seeing every overdub can only react to what is monitored at the time, and after completion, can't react to the consecutive layers (Sawyer, 2007).

Regarding this topic, Sawyer (2007) states: "Creativity in improvised innovation isn't additive; it's exponential. Herein he emphasises the special relationship between performers who play simultaneously can perhaps not be recreated by stacking parts through overdubs. Admittedly a large share of the cited sources focus on Jazz improvisation and performance, but as Keil & Feld (2005) suggest, these same ideas apply to other cultures and music, in this case Rock.

(To view examples of the *Nedmoot* method in action, see **Appendix B** for a regular video, as well as a 360 video which can be rotated using a mouse.)

Other Findings

Editing

Although the aforementioned 'Lego' approach was only employed for the free time version, all versions were edited and comped, albeit to a lesser extent³⁰. For all versions, I found that 'mistakes'³¹ were often unnoticeable when the click or percussion track was muted, and that it was possible to layer bass guitar over them without any apparent issues. Therefore I decided to mute the click track after recording drums, herein ensuring only problematic imperfections were corrected, as other inconsistencies (relative to the grid) were unnoticeable, or considered positive human tempo deviation. This meant the small 'mistakes' that were fixed, were corrected by ear, sometimes resulting in changes to parts that were perfectly in time with the grid, but lacked feel. A good example of this is a fill that sounded too robotic, having a better flow after manual correction (**Appendix C17**). This introduces the notion of 'humanising' after the performance, which could be a promising solution for making performances feel more organic, provided future software developments allow for this process to be automated. Unfortunately, features like 'swing'

²⁹ Please keep in mind there is a difference between the guitar sounds of the *Nedmoot* and regular version due to the use of a real amp and a Kemper. I didn't use a real amp for both, seeing I didn't have an isolated control room, and would still be able hear the loud amp, which would have compromised results (given one method focused on loud reamping, which isn't normally done).

³⁰ Suggesting minor fixes and comping of takes using playlists, which is considered normal in contemporary production.

³¹ In this case meaning parts that weren't played in time with the grid, click, and percussion.

cannot replicate the complex nature of human deviation (Hennig et al., 2011). Therefore, seeing manually editing an entire performance is time consuming, a highly detailed tempo map tailored to the song, as well as the player, is a better option currently.

When features like Elastic Audio are used to make changes, seeing they allow for 'gridless' editing, unlike Beat-Detective, phasing artefacts can cause problems.

Although they aren't very noticeable in context, these actually contributed to the overall shortcomings of the free time version, given its extensive use (**Appendix C19**).

Comping

As van de Poel (2020) suggested in my interview with him, editing can be a "slippery slope", seeing it's hard to draw a line after starting. I did indeed find that once I 'fixed' any mistakes, more problems became apparent, even though these weren't noticeable beforehand. For this reason, I decided to employ playlist substitution where appropriate as, even though it's seem less true to an organic performance, this can provide more natural sounding results faster compared to editing, and doesn't introduce aforementioned phase issues.

Conclusion & Future Research

Synchronisation Methods

Unfortunately, in this particular study, recording an entire song in free time without any kind of reference⁷ did not produce satisfactory results. Perhaps listening to reference tempi intermittently before recording individual sections when constructing a free time rhythmic base could help maintain an organically variable (yet constant) tempo. Another solution could be a 'reactive click track', meaning that it follows the player's pulse within a certain 'tempo bandwidth', similar to Canfer's (2016) 'Reactive Backing' software, putting the drummer in the proverbial 'driving seat', herein facilitating agency between the click and the players. Until such a tool is available however, the 'ultimate version' provides an example of how existing tools can be optimized and used to make overdubbing based recordings as good as possible. Herein suggesting methods that help mitigate the issues that characterize the development of drum kit performance, as outlined by Zagorski-Thomas (2010).

Monitoring

Considering the positive response towards monitoring without headphones using the *Nedmoot* method, as well as the higher dynamic awareness and control that was experienced when tracking the free time drums without headphones, it would be interesting to look into amplified monitoring for drum tracking more closely in the future. Of course bleed would occur to an extent, but similar to when a full bands record together,

gobos and screens can limit this. On the other hand it can potentially have a positive effect in gluing together a performance (Senior, 2019). Moreover, as Lanois (cited by Tingen, 1994) states: “A good performance equals a good mix”, suggesting the benefits of amplified monitoring in a space far outweigh the disadvantages. Moreover, Bauman (2016) suggest that listening through speakers allows peaks to partially dissipate in the air before reaching the ear, as opposed to headphones, which are directly over, or in the ears, herein limiting tinnitus related issues. Admittedly, instruments themselves can still cause aggravation when exceeding certain levels, but when monitoring headphones don’t have to be worn, earplugs can be used without needing to raise the click volume inside the headphones, reducing the risk of click-bleed. Moreover, tactile or visual solutions such as the Soundbrenner³² might also be worth exploring, seeing they negate the need for amplifying an audible click and also don’t require the player to wear headphones. Research shows that tactile click monitoring can provide similar results compared to a headphone-based approach, although the body’s response to a tactile input can result in asynchrony (Wanderley & Giordano, 2015). This suggests it might be worth exploring different delay compensation approaches, seeing I indeed found the Soundbrenner distracting when I used it in my Research Methods A1 experiments (**Appendix A3**).

Video Host & Syncing Solution

The technical difficulties experienced throughout the completion of this research project have clearly highlighted the absence of a suitable solution for recoding, syncing, and playing multiple video windows within one daw. For this reason, as part of my post-Master’s professional career, I seek to develop and patent such a solution. Given the cost of hologram machines such as the *PORTL*³³, as well as consumer projectors, developing this video-host plugin with a focus on VR seems more realistic. Of course regular video compatibility would also be included, albeit less effective judging from the results of my Research Methods A2 experiments. However, until such a solution is available, the time required to successfully prepare, film, transfer, sync, edit, and render video footage for every consecutive overdub, would outweigh the benefits. Not to mention the need to sync multiple daws over MTC³⁴ on a single computer, on top of the normal workload of engineering and performing.

(See **Appendix E** for a proposed ‘mockup’ of a syncing solution.)

³² A vibrating tactile click in the form of a watch that can be worn on wrists, or strapped around legs and across one’s chest.

³³ The *PORTL* currently exceeds \$85,000 in price, and is therefore not a realistic option for most. VR technology is already more accessible, and gaining in popularity for applications such as gaming and online meetings, therein being a more sensible solution for recording applications as well.

³⁴ MTC = Midi Time code, which allows multiple instances of DAWs to be slaved to a master session in which the actual recording happens.

Communication & Interaction

Despite largely positive data in relation to the *Nedmoot* method as a beneficial tool for overdubbing, it has become even clearer that the unique reaction that takes place when a group of individuals partake in a recorded performance is incredibly complex and not a sum of easily quantifiable elements. Perhaps AI developments that can change pre-recorded tracks based on what's being recorded could perhaps help in improving true interaction, but for the time being this will remain an issue. Moreover, although one-way communication was indeed present, the interactivity interface that was proposed in the A1 Project Proposal (See **Appendix A2**) could help facilitate even better communication. This could be re-incorporated by putting a separate screen in the space, showing only the interface in question.

Focus of Project

In hindsight it might have been more fruitful if I had focused exclusively on one subject, such as the *Nedmoot* method, or free time overdubbing, herein developing these ideas further. Additionally, more detailed quantitative data analyses, for instance using IOI³⁵, would have allowed for more general inferences to be made. Notwithstanding, I learned a lot from experimenting with all of the variables this study discussed, and despite not having completely finished a single version of the track, I have a good base to record over when I complete the cover. Next to this, many potential areas of future research were outlined, and data procured suggests some of the ideas this study brought forth could be relevant to other fields of research. Examples include research into non-synchronic flow due to distance, as opposed to non-synchronic flow due to a temporal difference, investigated in the works of Campelo & Howlett (2013) & Pratt, Hoose & Gordon (2019).

Lastly, there are many other important variables, other than performers playing synchronously, which contribute to the sound of (1970s) studio group recordings. This includes actants like tape technology, engineers, and producers, etc (Robjohns, 2013; Knowless & Hewitt, 2012; McIntyre, 2008). This highlights there is much more to investigate in attempting replicate the sound of a group performance from the chosen time period.

³⁵ Inter onset intervals (IOI).

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Appendices

Instructions

All appendices can be found on dedicated pages, hosted on my website. Although the main page was created to be intuitive, seeing it leads to all of the other subpages, I decided to add links to the individual examples separately as well, in case they're difficult to find. PLEASE use a desktop computer to access the files and website, as otherwise the formatting and content will be displayed incorrectly and items could go missing. This includes I pads and other tablets, seeing items don't tend to load properly on these either. The same goes for the 360 footage which, if watched in-browser on a mobile device, won't work. Only within the official YouTube application or on a desktop computer will it display properly. Lastly, some items on the page(s) might fade in as you scroll down, so make sure you keep scrolling down to view everything! It can take a second for things to load. There is a lot of extra content which is not directly referenced in this essay (assembly, explanations, photos), so feel free to explore all of the items on the website. Unfortunately I had to host the majority of videos on the website itself, which means there is no full-screen option or time-line to scroll through. This was due to copyright considerations, even though my project is fair/educational usage of the Yes material, YouTube can be a problem in relation to this. The project video will be uploaded to the main page within one week of the hand-in.

Main Page: <https://www.barrylimestone.com/organic-overdubbing>

A Appendices: <https://www.barrylimestone.com/prior-research-work>

B Appendices: <https://www.barrylimestone.com/nedmoot-method>

C Appendices: <https://www.barrylimestone.com/examples-evidence>

D Appendices: <https://www.barrylimestone.com/notes-details>

E Appendices: <https://www.barrylimestone.com/software-mockup>

If you encounter any issues when viewing the content that is linked above, please do not hesitate to contact me at: ylofnedmoot@gmail.com

Alternatively call +31623833390.