



Electric Guitar Production in Contemporary Rock Music

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ABSTRACT

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The purpose of this study was to examine three widely used methods of electric guitar production and explore their advantages and disadvantages when producing a four song EP for the band Nyrkkitappelu. The study includes interviews with three well-known professionals in the field of music production as well as recording and mixing sessions implementing the different methods discussed. The author of this thesis was working as the artist, recording engineer, producer, and mixing engineer.

The thesis was written as a study and a guide for people who are interested in learning about different methods of contemporary guitar production, and which methods to use in a particular situation.

The thesis begins with a general introduction and overview of guitar production. From there it moves on to the expert interviews, followed by the actual recording session, and finally a section discussing the results of the study. This study concluded that there is a time and a place for each method of electric guitar production, depending on the budget and equipment available. A media section consisting of 12 versions of the songs is included.

Keywords: electric guitar production, recording, mixing

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GLOSSARY

Boomy	An excessive amount of low frequency sound content
Control Room	The part of a studio where the producer or mixing engineer works in. Usually separate from the actual recording space in commercial studios.
DAW	Digital Audio Workstation
Db	Decibels
Diaphragm	A thin membrane that moves in reaction to external sound pressure variation and picks up audio information
EQ	Equalizer
Tone	The sound of the instrument, either by itself or processed.
Hz	Hertz
kHz	Kilohertz
Latency	The delay between what is played and what is heard back
Modeling	The practice of emulating pre-existing music production technology, amplifiers, instruments, or other hardware with the use of digital processing in either virtual software, or hardware form.

Patchbay	A hub that allows you to control your inputs and outputs from any device connected to it
Plugin	Software component that adds a specific feature to an existing computer program
Phasing	Caused by sound waves overlapping and cancelling out audio information due to differences in polarity or timing
Preamplifier/Preamp	An electronic amplifier that raises signal strength to a level that is required
Reamping	A two stage process whereby you first record a dry D.I. track and then re-record the track afterwards by sending the track through amps and/or effects
D.I. Box	A device used to connect a high-output impedance, line level, unbalanced output signal to a low-impedance, microphone level, balanced input usually via XLR cable
EP	Extended play, usually a 4-5 song musical piece

1 Introduction

The role of guitar production in rock music has changed quite significantly during the last few decades. The introduction and development of new digital tools such as amp-simulating plugins, and profiling amps such as the Kemper Profiler have made it possible to record quality guitar parts without the use of traditional amps and microphones. The standard method of guitar recording since the 1930's has been to book a studio, set up a tube amp, direct some microphones at the speakers and room, connect the microphones into a preamp, and record onto tape or a DAW. (Tone Topics n.d.) It is now possible to create quality guitar sounds from your home studio only with the use of an audio interface, a DAW and some plugins or profiling amps. (Duvet, Kopiez, Wolf & Weihe 2020.)

In this thesis project, I have set out to study which guitar recording techniques and tools work best for the recording and mixing of a 4 song EP "Nyrkkitappelu Hiton Nyrkkitappelu" for the band Nyrkkitappelu. I have chosen three different methods of guitar production, all of which are popular and widely used. The first method is a traditional method of using microphones, a tube amplifier, and a studio. The second method is using Slate Digital Overloud TH-U guitar modelling software, and the third method is using the Kemper Profiling Amp and software. Three different versions of four songs have been recorded and included in this study, all of which utilize a different method of guitar production. The aim of this study is to find out which method of guitar production is best suited for this particular project, and discusses how they could work for other projects as well.

2 Expert Interviews

For this thesis project I interviewed three well known professionals with expertise in the field of recording, mixing, and producing rock music. I was interested in finding out the extent that they utilise digital guitar tools in their day-to-day work, and if their opinions on their use would be similar or different to mine from this project. The full interviews can be found in the appendices section of this thesis.

2.1 Hiili Hiilesmaa

Hiili Hiilesmaa is a master of arts who has produced, recorded and mixed dozens of successful albums since the late 1990's. Albums produced by Hiili have sold over five million copies worldwide. He has been involved in projects in more than 20 countries. (Hiili Hiilesmaa n.d.)

2.2 Matti Lötjönen

Matti Lötjönen is a musician, sound engineer, and producer who has worked with bands like Huora, Day Eleven, and Negative. (Lötjönen 2022.)

2.3 Janne Tauriainen

Janne Tauriainen is the Head of Music Production studies at Tamk with a background in Audio Engineering and Music Production with over 20 years of experience in the field. He has worked with national and international clients such as YLE, BBC, Channel4, Century Media and Warner to name a few. (Tauriainen 2022.)

3 Background

The first electric guitar manufactured was a lap steel guitar called the “frying pan”. It was created by American inventor George Beauchamp in 1931 and subsequently manufactured by Rickenbacker Electro in 1932. (Truefire 2010.) There is debate on who was the first to record electric guitar for the first time, but it was most likely Les Paul, Charlie Christian, or George Barnes sometime in the late 1930’s. (Eric 2022.)

For around 5 decades, the general recording technique for electric guitar remained unchanged. It involved the use of a guitar amplifier and/or cabinet which had a microphone or microphones placed on it to pick up the sound and transport it to a recording device. At first the sound was engraved on to a wax disc, and from the 1950’s onward it was captured onto magnetic tape. Although there were innovations in sound quality and equipment, the general idea for capturing an analog amplifier with a microphone in a studio environment remained unchanged. (Beardsley n.d.)

Things started to change in the 1980’s when Tom Scholz from the band “Boston” launched the all analog “Rockman” headphone amplifier in 1982. This innovation allowed guitarists to get a professional sounding guitar tone out of a device roughly the size of a D.I. box. Seven years later, in 1989, Tech 21 released the iconic Sans Amp. This pedal-based guitar amplifier modeller allowed to choose from 3 different sounding amplifier and cabinet simulations. The innovations mentioned previously were still in the analog realm, but then in 1999, Line 6 introduced the POD digital guitar amplifier modeller. With this tool, guitarists were able get dozens of iconic amplifier models, cabinets and effects from one little box. The popularity of the POD made other companies take notice and start developing their own digital amplifier modellers. Today, digital amp modelling and profiling is more popular than ever, and technology has allowed to model amplifiers down to their individual components. Products like the Line 6 Helix, Fractal Audio Axe-Fx, Kemper Profiler and Neural DSP offer guitar tones that are so convincing that many leading professionals have integrated them into their gear or based their live and studio rigs around these products. Amplifier modelling plugins and software have also come a long way since the digital revolution of the 90’s, and

products like Amp Designer, Amplitube, and Overloud TH-U have proved to bring convenience and quality to home recording solutions. The innovations in digital amplifier technology have removed the necessity to record guitar amplifiers with microphones in a studio. (Kobylensky 2015.)

The live music world has been going towards in-ear monitoring and quieter stages for some time now. The consistency of digital modellers and profilers in comparison to mic'd amplifiers have made them a popular choice among touring musicians. The Kemper Profiler, for example, has become popular because it removes the necessity to rent gear on fly date concerts. This is because it allows you to create a digital profile of your own amplifier and cabinet and use the direct output of the profiler to create the front of house mix and monitor mix. This saves time because there is no need to place microphones in front of guitar cabinets and mix the signal. It also makes the guitar tone more consistent from night to night because the tone is always coming directly from the Kemper Profiler's direct output, instead of having to worry about placing microphones on guitar cabinets. (Premier Guitar 2019.)

The quality and versatility of amp modelling technology have come a long way since the beginning of the digital revolution. The convenience of these products has made them popular among professional musicians especially in the live music industry. This study will explore and discuss their functionality on the record production side and compare the new technology with traditional methods of electric guitar production. (Tone Topics n.d.)

4 Preparations

4.1 Method

I had previously recorded all of the other tracks for this song (Drums, Vocals, Bass, Guitar, Percussion) in a separate session, so that I could focus solely on the guitar parts for this study. The first thing to take into consideration when aiming to get a consistent result from my study was that each guitar performance for each version of the song (amp, Slate Plugins, Kemper Profiler) had to be identical. A change in guitar performance had the possibility of influencing the outcome of the song, instead of the guitar tone, which was the focus of this study. This possibility had to be taken out of the equation. In order to keep the performance identical for each version, I recorded the traditional amplifier first, with the signal chain passing through a D.I. Box so I was able to record the D.I. track of the performance as well. I would then use this D.I. track with the Slate Plugins and Kemper Profiler, to be discussed later. (Project Studio Blog 2012.)

4.2 Equipment and Gear

For this study to be conducted successfully in a credible manner, a significant amount of equipment was needed to make recording and mixing possible from a technical standpoint. Having access to TAMK's equipment and studio was vital at this stage because I would not have been able to afford all of the equipment and studio fees on my own. The financial considerations of guitar production will be discussed later in the study.

4.2.1 Digital Audio Workstation

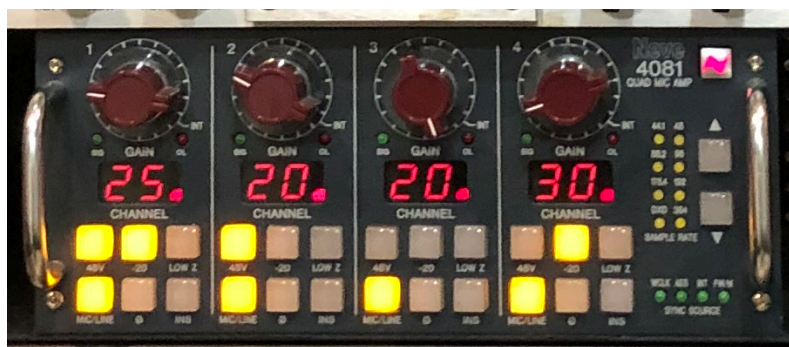
The Daw I used for this study was Pro Tools X seen below in Picture 1. The reason I chose to work with this DAW is that it is the DAW I am most familiar with and it is still regarded as the leading industry standard for professional studio recording. (Recording Studio 101 n.d.)



PICTURE 1. View of the Pro Tools mix window. (Pöllänen 2020)

4.2.2 Preamp

I decided to record all of the guitar parts through the Neve 4081 Preamp (Picture 2) at Tamk Studios. I chose this preamp because of its reputation, the classic sound character, and its ease of use. (Robjohns 2011.)



PICTURE 2. Neve 4081 Preamplifier. (Pöllänen 2020)

4.2.3 Amplifier

The guitar amplifier I worked with in this study was a 100 watt Marshall 2555X Silver Jubilee Reissue (Picture 3). I chose to work with this amplifier because it has a good “crunchy” distorted tone suitable for the Rock and Punk Rock genres.



PICTURE 3. Marshall 2555x Silver Jubilee Tube Amplifier. (Pöllänen 2020)

4.2.4 Microphones

The microphones I chose for the recording of the guitar amplifier were a Shure SM57 dynamic microphone, an AKG C414 large diaphragm condenser microphone, and an A.I.R Peacemaker Ribbon microphone (Picture 8). The reason for choosing these was their historical significance and reputation in the field of rock guitar production. The SM57 is arguably the most widely used microphone in electric guitar production and capturing live electric guitar as well. This is due to its durability, ability to deal with high sound pressure, and a frequency response that cuts through in the mix. By using this microphone, I was able to play my tube amp at a high volume, when it sounds significantly better than at low volumes. (SM57 Dynamic Instrument Microphone n.d.)

The AKG C414 was chosen because of its flat frequency response, its ability to capture sparkling highs, and a clear low end. (Echevarria 2021.) The combination

of a condenser microphone and a dynamic microphone are often blended together in the mix in guitar production to create the best possible guitar tone. It is important to place the diaphragm of each microphone at the same distance from the sound source in order to avoid phasing issues. Phasing occurs when audio waves overlap and cancel out audio information. In this case, it is caused by the microphones picking up sound waves at different times. (Coppinger 2012.)

The A.I.R Peacemaker Ribbon microphone was chosen because of its ability to pick up the ambience of the room due to its figure 8 polar pattern. (Hipponen 2020.) Another factor influencing this choice was the natural and warm sound that ribbon mics are known for. The Ribbon was placed further away from the amplifier to pick up the natural sound of the amp in the room. (Sweetwater 2022.)

4.2.5 Kemper Profiler

The Kemper profiler (Picture 4) has become a widely used tool especially among touring guitarists who perform overseas. The advantage of this piece of digital hardware, is its compatibility, and consistency of sound. (Ciarla 2021.) The Kemper weighs around 5kg and can be plugged straight into the mixing board through its external outputs, removing the need for placing microphones in front of a cabinet. The Profiling technology makes it possible to mimic your own guitar sound from a traditional analog amplifier and place it in the digital realm. This makes it possible to have the same guitar sound every night, regardless of the venue. This often saves time, money, and nerves because there is no need to mic the cabinets. (The Kemper Profiler N.d.) According to the Kemper website, it is “the first digital guitar amp to really nail the full and dynamic sound of a guitar or bass amp (Kemper n.d.). In this study I wasn’t interested in profiling my own amplifier, but instead, using the sounds that were ready to use in the Kemper to begin with, and finding out how well they would work in the recordings.



PICTURE 4. The Kemper Profiling Amplifier. (Pöllänen 2020.)

4.2.6 Overloud TH-U Slate Plugins

The TH-U guitar modelling software (Picture 15) advertises itself as “the all in one solution to process your electric guitar, acoustic guitar and even bass” (Overloud Audio Solutions n.d.). It is one of the most modern and versatile guitar modelling plugins on the market (Overloud Audio Solutions N.d.) I chose to work with this software because I am already a subscriber to Slate plugins and I wanted to test if this software was usable in contemporary rock music. The difference between amplifier modelling and profiling (discussed in the previous segment) is that modelling replicates or “models” an amplifier circuit and creates a digital replica of how that amp would theoretically behave given its circuit design characteristics. Profiling on the other hand creates a digital replica of a specific amp at the point in time when it is “profiled” based on the amp’s actual response characteristics. (Schiebel 2022.)

4.2.7 Guitars

The guitars I chose to work with on this record were a Gibson SG Standard from 2012, and a Japanese Fender Telecaster from 2009. I chose these guitars because I wanted to get a different kind of sound on each side of the stereo image

to make it sound wider and bigger (McCallister 2021). Things to take into consideration before recording were tuning and string gauge. I wanted to use a heavier string gauge than usual to ensure that the guitars would sound more in tune when fretting power chords high up on the neck. My playing technique is quite hard, and I sometimes bend strings more when higher up on the neck. With this in mind, I strung both guitars with 0.11-0.49 strings. The next step was tuning and checking the intonation of the guitars. Proper intonation ensures that the guitar plays in tune throughout the whole neck of the guitar. Intonation is checked by striking a note on the 12th fret, followed by the harmonic on the 12th fret. If there is a difference in the tuning of these two, the guitar is not intonated properly. The string must be shortened or lengthened by moving the bridge saddle until both pitches are correct. (Ownes n.d.)

4.3 Recording Space

The space I chose to record my guitars in were the two adjacent control rooms at TAMK studios in Tohloppi, Tampere. I was recording the guitar parts on my own, which meant I had to be the recording engineer as well as the artist simultaneously. With this in mind, I chose to set up my guitar amp and microphones in the control room adjacent to the one I had the computer and recording equipment in. It was much easier to make adjustments to mic placement when there was only one doorway between me and the amplifier, instead of having to go through numerous doors and stairs to get to the studio space on the other side. I was able to connect the cables from the microphones into a patchbay, which allowed me to control the inputs from the control room, without having to run the cables through the doorway. This allowed for better monitoring of the guitar sound because the door could be kept closed and there was minimal sound leaking through it. The control rooms are specifically designed for mixing purposes and therefore minimize the possibility of early reflections while recording. Early reflections occur when sound waves from a sound source reflect off surfaces and come back to the microphone or ear at a different time than the original sound source, creating phase issues. (Sweetwater 2016.)

4.4 Psychological Considerations

A studio environment can be a very intimidating place, especially for a novice who lacks experience. Sometimes the most difficult obstacles to overcome in the studio environment are the psychological ones. How to make the artist feel comfortable and in a psychological frame of mind where they can perform at their best. (Carter 1997.)

I had some previous experience from studio work as a musician, but very little as the engineer/mixer/producer of a record. On this project, I had to be the guitar player as well, so it created a few more obstacles to overcome. For example, I had to record the basic guitar tracks with the drummer and bassist in the control room while taking care of recording everything as well. This was because of our preference of recording the basic tracks live with the drums, instead of having a demo guitar or bass recorded beforehand. This arrangement is not something I would recommend to anyone as there were so many different factors to keep in mind during recording that I had trouble focusing on the guitar playing and had to redo the guitar parts at a later date. In order to get the best performance possible, the guitarist should only have to focus on one thing: playing the guitar. All other things related to the recording process should be taken care of by the engineer or producer.(Harrell 2012.)

A key element of a successful recording is keeping a positive atmosphere in the studio. Encouragement and positive feedback go a long way to keep the creative juices flowing and making the artists feel comfortable. If there are some suggestions that the producer believes will improve the performance, they should be made in a positive and encouraging manner, instead of criticism. One way to look at it would be to think of an encouraging coach. Someone who will bring the best performance out of the artist. (Harrell 2012.) Keeping a positive and encouraging atmosphere is usually not a problem when working with other people, but working on this project mostly alone, it was often hard to block out self-criticism and perfectionism while working on the guitar parts. When I caught myself being my own worst critic, I had to take a step back and remind myself that I had time and I knew these songs well enough.

Another important psychological factor to consider is the use of time. Sometimes deadlines can be a good thing because they create a sense of urgency to get things done. Rushing, however, seldomly amounts to anything of great quality. It is important to have a steady workflow and pace in order to get things done in a reasonable amount of time. Breaks should be taken often to reset and remain focused on the task at hand. Similarly, the workday should not be too long. Recent studies have shown that people remain truly productive for around 3 hours a day and 5 hours at a maximum (Perry 2021). A 3-hour workday in the studio is usually not very realistic because of scheduling issues, but days should not be drawn out to be too long. When the first person gets tired, it is usually the last signal to call it quits and continue working the next day if the schedule permits it.

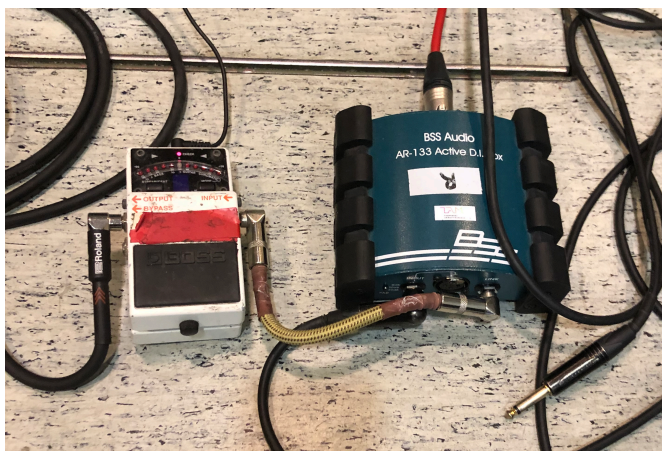
5 Recording

After I had finished recording all of the basic tracks (Drums, Bass, Demo Guitar), vocals, and percussion, I was ready to start recording the electric guitar, which was the focus of this study.

This section will discuss the tracking process of the guitar parts for the Nyrkkitappelu EP “Nyrkkitappelu Hiton Nyrkkitappelu”.

5.1 Signal Chain

I set up my signal chain so that one signal went from my electric guitar (Gibson SG Standard) to the input of the D.I. box via guitar cable (Picture 5). After this, the signal went from the output of the DI Box by XLR cable into the Neve pre-amp, and from there into the DAW (Picture 7) to be recorded onto one track. The second signal came from the “Link” output of the DI box and went through my tuner and into the Amplifier input situated beside me in the control room (Picture 6). The Marshall 2555x head was patched through into the next control room where it was plugged into an Orange 4x12 cabinet. Using this method, I was able to capture the guitar performance and use the same performance with the Slate Plugins and Kemper Profiler as well. (Sound on Sound 2022.)



PICTURE 5. D.I. Box and Tuner in the signal chain. (Pöllänen 2020)



PICTURE 6. One signal (red XLR cable on the right) going from DI Box into the Neve Preamp, and the other signal (black guitar cable) going into the input of a Marshall amplifier. (Pöllänen 2020)



PICTURE 7. The guitar tracks in Pro tools on the left highlighted in red colour. The Ribbon microphone track, AKG 414 track, Shure 57 track, and D.I. track. (Pöllänen 2020)

5.2 Microphone Placement

Before starting to record the guitar parts, it was important to raise the amplifier off of the floor by placing it on top of two chairs. This was to prevent the microphones from picking up any early reflections coming off the floor and causing phasing issues. Keeping the amp on the floor can also cause boominess in the room sound which is not picked up by the close microphones. (Sweetwater 2016).

As discussed previously, I chose to work with three microphones when recording my guitar parts with the traditional amplifier. This was due to personal experience in previous recording projects and tried and true methods used widely in the music production industry.

The positioning of the microphone between the centre and the edge of the speaker is the factor that has the most influence on the tone of the recording. Placing the microphone directly in the centre of the speaker will have the brightest

sound, capturing more high frequency content. Placing the microphone at the outer edge of the speaker will have the darkest sound, capturing more low frequency content. Placing the microphone anywhere between the centre and edge of the speaker will provide a blend of these two extremes. Another variable to experiment with could be the angle of the microphone towards the speaker. When the diaphragm is parallel to the speaker, it captures a brighter sound than when it is on an angle. (Audio University n.d.)

I chose to place the Shure SM57 and AKG 414 microphones parallel to the speakers directly in front of the point where the dust cap meets the cone of the speaker (picture 8). One microphone placed in front of each bottom speaker on the right and left sides of the amplifier. After testing the sound, I found that this position gave me a sound that was bright, but also had enough low frequencies. When working with dynamic microphones with a cardioid polar pattern such as the Shure SM57, it is important to consider the proximity effect. The proximity effect occurs when a directional microphone is placed close to a sound source and it picks up more low frequencies causing “boomyness” in the tone. I placed the SM57 about an inch away from the grill cloth and found this to be the tone I was looking for. The AKG 414 was placed on the speaker to the right in a similar manner, aiming to get the diaphragm of the mic at the same distance from the grill cloth as on the SM57 to avoid phasing issues. (Sweetwater 2016.)

The function of the Peacemaker A.I.R. ribbon microphone was to pick up the sound of the amp in the room. I did not know how this particular room would sound in the recording so this microphone was more of a test to see if I could use it in the final mix. It was placed around 1.5 metres away from the amplifier roughly in the middle of all four speakers in the centre of the cabinet.



PICTURE 8. Microphone setup clockwise from top left: Shure SM57 dynamic microphone, AKG C414 condenser microphone, A.I.R Peacemaker ribbon microphone. (Pöllänen 2020)

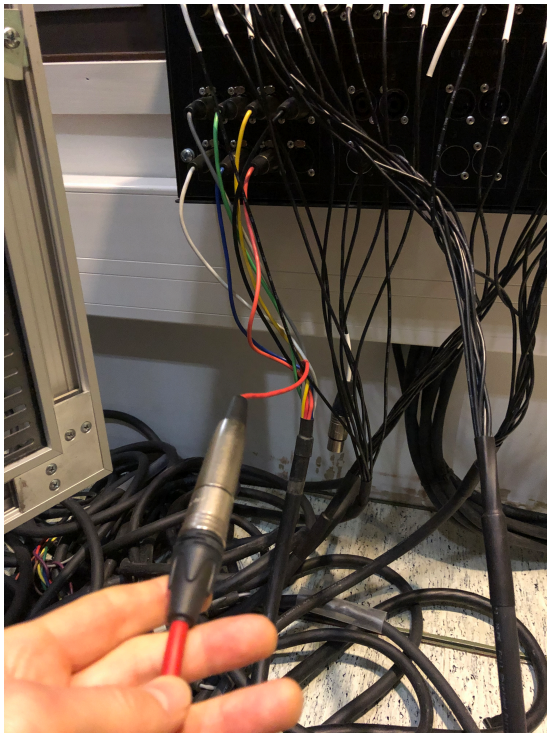
5.3 Tracking

With the microphones in position, the next step was to do the soundcheck and make sure the preamp gains were at a reasonable level. The suggested level when recording digitally is around -14db to -18db (Gallagher 2012) in order to save enough headroom for the mixing process and to avoid digital clipping. Once I had the input levels of the microphones set up to my liking, I was ready to record the performance. I recorded all of the guitar parts on the left side of the stereo image first, song by song. Usually, I had a warm-up take and then one or two takes until I was satisfied with my performance. On occasion I punched in to fix a mistake here and there. After this, I switched guitars and recorded the guitars on

the right side of the stereo image in the same way. I also had some leads and solos to record in the middle of the stereo image, and for those I changed strings back to my normal 0.10-0.42 gauge and retuned my SG before the performance. I also tweaked the amplifier sound a little bit to separate the sound from the one I played on the left side of the stereo image. With all the guitar parts recorded with the traditional amplifier method, it was now time to get into the digital realm.

5.4 Kemper Profiler

In order to use the same guitar performance for the Kemper Profiler guitar sound, I had to reroute the D.I. signal that I captured when recording the tradition amplifier into the Kemper. To accomplish this, I had to find the correct pro tools output from the D.I. track's output pulldown menu and connect an xlr cable to the corresponding XLR output that was plugged into the patchbay (Picture 9).

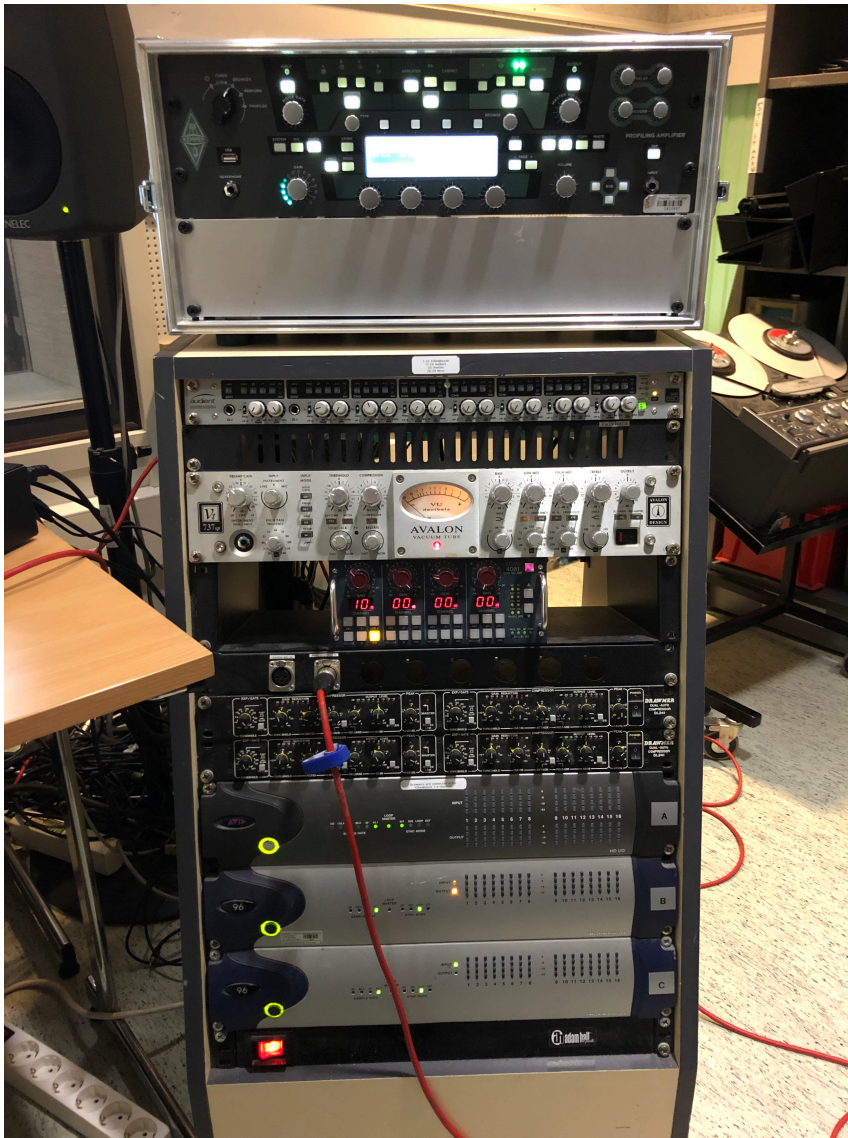


PICTURE 9. Connecting XLR cable to Pro Tools Output. (Pöllänen 2020)

Then I connected the xlr cable to the return input of the Kemper Profiler (Picture 10) so that the D.I. signal was being fed into the Kemper. The final step was to connect the processed signal from the Kemper back into the DAW by connecting an XLR cable from the main output of the Kemper to the Neve Preamp (Picture 11).



PICTURE 10. Connecting the D.I. signal to Kemper return input and taking the processed signal out of the Kemper from the main output. (Pöllänen 2020)



PICTURE 11. Connecting the Kemper signal from its main output to the input of the Neve Preamplifier (Pöllänen 2020)

Now I had my signal chain set up so that when I created a new track on Pro Tools and selected the correct input, I heard the processed Kemper Profiler guitar tone when recording. This is known as “Reamping”. Reamping can also be done using a re-amp box and a traditional amplifier, but this is how reamping is done with the Kemper Profiler. Now I just had to select a rig from the Kemper that sounded appropriate. The difference between a rig and a profile is that a profile is a snapshot of a certain amplifier and cabinet whereas a rig has all of the pre and post effects as well (Kemper n.d.). However, people often speak of a rig and profile and mean the same thing. I flipped through the different rigs for a while, listening

to what sounded best, and decided to record the left guitar parts with a rig called “Fishers Jay MP100 Hi1” (Picture 12).



PICTURE 12. Selecting the rig to reamp with on the Kemper Profiler (Pöllänen 2020)

To record the guitar parts, I engaged the record enable button on the appropriate track, pressed record, and let the song play through. Then I moved onto the next song and repeated the process. After doing this for each song, I created a new track for the guitar parts on the right side of the stereo image and started looking for a suitable rig from the Kemper. A rig called “MeBo Still Netto Rock” (Picture 13) proved to work well with the telecaster’s D.I. sound. I repeated the process I had just done previously for the right guitar parts as well.



PICTURE 13. The rig for the guitar parts on the right side of the stereo image and lead parts. (Pöllänen 2020)

Finally, I had some lead parts and guitar solos to reamp as well. I liked the sound of the MeBo Still Netto Rock rig, so I raised the mids and bass a little bit and used that tone for those parts. With the left, right, and lead guitar parts done, The Kemper part of the study was complete, and I was ready to move on to the Overloud TH-U Slate plugins.

5.5 Overloud TH-U Slate Plugins

The final phase of this study was to use the Overloud TH-U guitar modelling software for the third versions of the 4 songs on the EP. This was the most straightforward to accomplish since the plugin could simply be placed in the insert section of the D.I. track (Picture 14). Once inserted, I listened to the song and searched through the different rigs and guitar tones found in the software until I found something that sounded suitable (Picture 15). There was no need to record the part onto a new track like with the Kemper because the inserted plugin allowed for the D.I. track to play the processed signal. The next step was to choose a suitable

sound for the stereo right guitar (Picture 16), and finally for the leads and guitar solos (Picture 17).



PICTURE 14. Screenshot of Pro Tools mix window. The tracks that have the yellow “solo” button enabled have the Slate TH-U plugins directly in the insert of the track. (Pöllänen 2020)



PICTURE 15. Screenshot of TH-U Overload software. This picture shows the guitar rig used for the left side of the stereo image with the Gibson SG. It has a model of an Ibanez Tube Screamer, an MXR Phase 90, a Marshall JCM 800, a

cabinet, and a rack reverb. It visually portrays the signal chain from left to right. (Pöllänen 2022)



PICTURE 16. Screenshot of the Overload TH-U guitar rig used for the guitar parts on the right side of the stereo image with the Telecaster. (Pöllänen 2020)



PICTURE 17. Screenshot of the Overload TH-U guitar rig used for the lead guitar parts and guitar solos. (Pöllänen 2020)

6 Comparison

According to (Hiilesmaa 2021), (Lötjönen 2020), and (Tauriainen 2020), there are numerous factors to take into consideration when striving for quality guitar production. Tauriainen(2021) underlines the importance of the player, the instrument, the equipment and signal path, while Lötjönen(2020) places significance on the tuning of the instrument and phase issues. Hiilesmaa(2020) suggests that guitar production involves multiple factors(guitar pick, type of guitar, strings, cables, intonation, amp, speaker, room, microphones, preamp) that all have to work well in order to achieve the desired result. In this section I will discuss my findings from this study about contemporary guitar production. I will discuss the advantages and disadvantages of each method of guitar production and try to establish which methods were best suited for this particular project.

6.1 Traditional Amplifier Method

I ended up using the traditional amplifier sounds for the final mix of the EP. There are numerous factors that led up to this decision. Firstly, I found the traditional method of recording a guitar amplifier with microphones the most fun. I don't know if this is because it is the way most of my musical influences and heroes have recorded their guitars, but there is something special about setting up a tube amplifier in a studio space and playing through it at high volume that makes it exciting. The process of choosing microphones and setting them up in your own specific way also creates a feeling that you are making an original guitar tone that no one has ever made before. By far the most unique guitar tones can be achieved by using the traditional method of recording an amplifier in a studio space. This is because of the unique combination of the microphones, the amplifier settings, the guitars used, and the room ambience of that particular space. By adjusting the levels of these microphones and using different types of equalization, compression, and effects, the guitar tone can be shaped endlessly. I found that in the mixing process, the traditional guitar amplifiers had more presence and cut through better in the mix. Due to this I perceived the guitar parts to be louder than

with the Kemper and Plug-in methods. This meant that I could have the guitars at the same level, but they were more audible and sounded bigger and better.

6.1.1 Disadvantages

The biggest disadvantage of electric guitar production with the traditional amplifier method is the cost. If I had booked a commercial studio for this project, I would have had to pay for the rent of the studio space, rent of the equipment, License for Pro Tools, and the maintenance of my own equipment (guitars, amplifier, pedals, cables). This could easily be in the thousands of Euros cost-wise, and I would not have been able to afford it if I did not get the studio and equipment rent-free for educational purposes. Another disadvantage is that it is quite difficult to create a guitar tone in a room and to capture that exact guitar tone recording with microphones. I have found that I always perceive the guitar tone differently when standing in the room with the amplifier than when I hear it back from studio monitors or headphones. With modelling and profiling, it is easier to hear the “finished” guitar tone right away, instead of experimenting with mic placement, blending of mics, EQ settings, compressor settings, and effects. The final disadvantage can also be seen as an advantage to some extent as it involves the endless possibilities that the traditional amplifier method can offer. There are so many different factors, combinations, and recording methods to consider that finding the appropriate guitar tone can be very time consuming.

6.2 Kemper Profiler Method

6.2.1 Advantages

I found the main advantages of the Kemper Profiler to be its convenience, flexibility, relative ease of use, and quality of tones. One of the Kemper’s biggest advantages is that it has everything you need to record guitar parts without having to worry about speakers, cables, microphones, pedals or acoustics. With the Kemper it is possible to download different amp profiles from a growing community of users and by adjusting them to your liking, create authentic guitar tones

for your recordings. Using headphones, it is possible to track guitar parts at any time of the day or night. (Osborn 2019.) I found that the guitar tones that I used were quite authentic and I would probably not be able to tell the difference between a Kemper and a traditional amplifier when using guitar tones with higher gain levels. However, as Hiili Hiilesmaa(2020) suggests, guitar profilers and plugins do not work as well when recording lower gain guitar parts such as those found in the Blues genre. This is because guitar tones in that genre are usually so unique and personal to that particular player. In more high-gain genres the guitar tones have become more standardized and similar to each other. (Hiilesmaa 2020.)

Another major advantage of the Kemper when comparing to traditional amplifiers is its flexibility. The guitar tones and effects can be separated from the performance and adjusted later on in the production process if needed. With the traditional amplifier method, the guitar tone is locked in during the performance phase, and adjustment possibilities are more minimal. This can be seen as an advantage as well as a disadvantage because when locking in the guitar tone during the performance it gives you one less thing to worry about during the mixing phase. (Lötjönen 2021.)

The Kemper looked quite complicated at first glance compared to a traditional amplifier, but after watching some tutorials on Youtube and the Kemper website, it was quite easy to scroll through the different profiles and rigs and find the appropriate tones for this recording. The re-amping technique that I used was also quite easy to accomplish and it eliminated the need to have a studio space where high volumes and microphones would be used. This factor would bring down the cost of production significantly because there would be no need to rent a studio space when using the Kemper Profiler.

6.2.2 Disadvantages

One disadvantage of the Kemper is that it is quite expensive selling currently at around 1800€ on the Kemper website (Kemper n.d.). However, when considering the cost of a traditional guitar amp, cabinet, cables, effects pedals, studio rent,

and equipment rent, it is still more cost-efficient in comparison to the traditional method of guitar production.

Another disadvantage is the complexity of the user experience. I personally enjoy things that are simple and have the least amount of buttons and knobs to think about. Looking at the Kemper the first time, it looked a little bit like the controls of a spaceship, and I did not particularly enjoy learning how to navigate my way around the system. Another turn-off for me was its visual design. It did not look like an amplifier that I would like to have on stage with me. Luckily this study was only about studio recording, so I was able to keep it well hidden from the eyes of the public.

Another issue some people have had with the Kemper is latency. People have experienced more latency when adding effects to the effects loop and when plugging it into the computer via USB. (Gibson 2022). I did not experience any noticeable latency issues when recording the guitar parts, but a computer with less processing power could possibly cause more problems in this area.

After listening to the mixes of the songs again after a long break, I found that I enjoyed the Kemper version of the song “Mä Haluun Muijan” the most out of the three different versions.

6.3 Slate Overloud TH-U Plugins

6.3.1 Advantages

Out of the three different guitar production methods, the amplifier modelling plugin method was by far the most cost-efficient and convenient. The only things needed to record the guitar parts with this method were a guitar, guitar cable, audio interface, DAW, and Slate Plugins license. For a price of around 15€, I had access to 32 modelling amplifiers, 39 cabinets, and 31 effects pedals. The Overloud software also offers a “Rig Player” feature where you can play rig models that are

based on real setups. This is similar to that found in the Kemper Profiler. In order to make the guitar tones as unique as possible, it is possible to adjust microphone placement, change preamp and power tubes, and even adjust the voltage of the amplifier. This was by far the cheapest alternative out of the three guitar production methods.

Other than price, the major advantage of this method is that it allows for the ability to record guitar parts virtually anywhere. This provides a major psychological advantage because some artists feel more comfortable recording their guitar parts at home or somewhere other than a studio environment. The studio can be an intimidating place and being under the scrutiny of the engineer, producer and bandmates can in the worst case amount to a poor performance. I recorded some of the guitar parts at home, and some at my parents' summer house 35km away. The only equipment I needed was my laptop, headphones, and small audio interface. This was because I had already recorded the guitar D.I. track and I was using that track with the Overloud Plugins. By using the modelling plugin method, I was able to record guitars in numerous locations without the need for a studio space.

As with the Kemper method, the modelling plugin method allowed for flexibility if I had to adjust the guitar tone at any given time. In fact, the plugin method proved to be the most flexible because the guitar tone comes straight from an inserted plugin on the D.I. track. Therefore, in order to adjust the guitar tone, I only had to open the plugin and adjust parameters in the software. With the Kemper method, I had to commit to a sound during the reamping process and record the D.I. signal onto another track. If I wanted to adjust the sound later, I would have to repeat the reamping process again.

Another advantage of plugins is the versatility of guitar tones. Using plugins, it is possible to store a huge library of different guitar tones on your computer without the need for any hardware. Also, guitar plugins do not require maintenance like real amplifiers and other studio equipment do.

6.3.2 Disadvantages

The main disadvantage of the Plugin method is that it is more difficult to create a unique guitar tone. Even though the plugin allows the player to adjust numerous different aspects, the sound is still based on somebody else's opinion of what a good guitar tone should be. In addition, capturing the room ambience is something that is very difficult to emulate with plugins. When striving for a guitar tone with plenty of room ambience, it is probably a better idea to record the guitars in the traditional way. (Stent 2019.)

As with the Kemper, latency might be an issue with the modelling plugin method. It is important to have a high-quality audio interface and enough processing power on your computer to combat this. I did not experience any latency during this study.

The final disadvantage of the plugin method is that it just sounds a little bit different than an authentic tube amp. I am used to standing in front of a large amp and feeling the air pressure and ambience between me and the speakers. Additionally, I enjoy how a tube amp reacts to my playing dynamics and the controls on my guitar. When using the Overloud plugin, the dynamics and feel are completely different than with a real tube amplifier. However, when listening to the final mixes of the songs, the guitar tones made with the plugins and with the traditional method sound quite similar.

7 Conclusion

It was interesting to undertake a project where I tested three different methods of electric guitar production. When starting the project, my hypothesis was that I would want to use the traditional amplifier versions of the songs as the final versions that went to the master for the Nyrkkitappelu EP “Nyrkkitappelu Hiton Nyrkitappelu”. This ended up being the outcome, but I am of the opinion that the psychological factors involved are what lead to that decision more than the actual guitar tones. There is something more personal and difficult in creating guitar tones using the traditional method when compared to the Kemper and Plugin methods. I perceived the traditional amplifier versions of the songs to sound better, but if I was given a blind test with no prior knowledge about this project, I am not sure if I would be able to distinguish between the different versions. I have found that I use both the traditional method and amplifier modelling plugins in my numerous musical projects. The Kemper on the other hand, is something that I have not deemed necessary to invest in as of yet.

Recording guitars with the traditional method is expensive, time consuming, and needs far more equipment and an appropriate recording space to accomplish. However, many guitarists love the organic feel of an analogue tube amplifier and if you're looking to capture your own unique sound, it is still the best method out of the three. Modelling plugins are versatile, convenient, and provide a huge amount of different amplifier models for an affordable price, but they lack in the dynamic response and feel of a traditional amplifier. The Kemper is a great tool for reamping, and the guitar tones I used sounded authentic enough in the mix. However, I perceived it to lack something in the dynamic response as well. This is possibly due to psychological factors and the fact that I just wanted the traditional amplifiers to sound better in my ears. All three of the guitar production methods would have worked well on the finished record, and it is doubtful that the different versions would have been perceived any differently by the listeners.

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APPENDICES

Appendix 1. Interview with Hiili Hiilesmaa

1(3)

Date of interview: 25.05.2021

Interviewer: Juha Pöllänen

1. Käytätkö/oletko käyttänyt digitaalisia vahvistin pluginejä, tai profilereita työssäsi?

- *Kyllä, riippuen tilanteesta. Jos soundi vaikuttaa esitykseen, on usein hyvä että soundi on mahdollisimman valmis ääntitystilanteessa. Esim. Feedbackiä tai Wah-pedaalia käytettäessä on hyvä, jos soundi on valmis. Ajattelen usein niin, että jos liikutaan akselilla Bluesista Metalliin, niin plugarit ja mallintavat palvelevat projektia sitä paremmin mitä lähemmäs metallia mennään ja päinvastoin. Bluesissa soundi on niin oleellinen osa soittajan persoonaa, kun taas metallissa on usein standardinomainen soundi, jota kaikki soittajat tahtovat käyttää.*

-

2. Mitä olet käyttänyt?

- *Kemperä, Axea ja Amp-farmia, Sans-amp. Mitä milloinkin ja usein kitaristeilla on myös omia mallintavia vahvistimia.*

3. Mitä etuja näet kitaravahvistin plugineissa ja kemper tyylisissä profile-reissa?

- *On iso etu, että soundin lukitsemisen ja esityksen voi tarvittaessa erottaa toisistaan. Jos kitaroita äänitellään esim. omatoimisesti, voi kalliimman studioajan kuluissa säästää. Haittapuolella on riski siitä, jos kitaristi ulkoistaa soundin teon jollekin toiselle eikä ole itse paikalla, voi syntyä näkemuseroja.*

2(3)

4. Uskotko musiikinkuuntelijan kuulevan eroa traditionaalisen ja digitaalisen välillä?
 - *Kyllä, esim. varsinkin feedback, fuzz, whammy kuulostavat usein erilaisilta. On toki subjektiivista miten kukin kuulija kokee kuulemansa. On kuin vertaisi vihreää ja sinistä, toinen miellyttää tietyssä tilanteessa enemmän.*

5. Onko digitaalisessa maailmassa eroja miksaus näkökulmasta?
 - *Plugareita tai mallintavia voi säädellä enemmän vielä miksausvaiheessa toisin kuin valmista kitarasoundia. On enemmän mahdollisuuksia. Toisaalta miksausessa on lukematon määrä muita pieniä päätöksiä tehtävänä, joten voi olla hyötyä, että kitarasoundi on päätetty valmiiksi.*

6. Uskotko traditionaalisen vahvistimien äänityksen mikillä siirtyvän joskus kokonaan sivuun?
 - *Olen varma, että vahvistimia mikitellään ikuisesti, sillä monet rakastavat sitä ja itse valikoitujen vahvistimien soundeja. Monille oma soundi on tärkeämpi kuin hyvä soundi. Samoista syistä pianoja ja rumpujakin mikitellään, vaikka saatavilla on valmiita hyvälaatuisia soundeja.*

7. Mitkä ovat mielestäsi tärkeimmät asiat huomioida kitaran äänityksessä ja miksausessa?
 - *Teknisestä näkökulmasta kaikki pienet asiat tulee olla kunnossa, sillä kyseessä on kokonaisuus. Kuten F1- autoissakin, kuljettajan ohella tärkeintä ei ole moottori, renkaat tai aerodynamiikka vaan aivan kaiken on toimittava moitteettomasti, jos miellii saada päävoiton. Kitaran äänityksessä tarkistan teknisessä mielessä mm. plektran, kitaramallin, kielet, piuhat, hienovireen, vahvistimen, kaiuttimen, tilan, mikin/mikit, etuasteen.*

- Näiden lisäksi on toki vielä fiilis ja musiikilliset asiat. Kun kaikki on kunnossa miksaus on usein balanssien säätöjä vaille valmis. Usein budjetti on rajallinen ja on priorisoitava miten paljon studioaikaa on tarkoituksenmukaista käyttää eri asioihin.

Appendix 2. Interview with Matti Lötjönen

1(2)

Date of interview: 29.04.2021

Interviewer: Juha Pöllänen

1. Käytätkö/oletko käyttänyt digitaalisia vahvistin pluginejä, tai profilereita työssäsi?
 - *Onhan noita plugeja tullut käytettyä silloin tällöin, mutta en koskaan ikään kuin ”pääraidoissa”. Joskus kuitenkin mikitetyn kitaravahvistimen tukena layer-hengessä. Profilereiden kanssa en ole ollut tekemisissä hupites-tausta ja demottelua lukuunottamatta. Olen kyllä miksannut liveinä kempe-riä. Pyrin järjestämään tuotannot sillä tavalla, että voin aina tehdä äänityk-set perinteisillä vahvistimilla.*
2. Mitä olet käyttänyt?
 - *Pääasiassa Line6 amp farm, digidesign eleven ja sansamp PSA-1*
3. Mitä etuja näet kitaravahvistin plugineissa ja kemper tyylisissä profile-reissä?
 - *Total recall ja helppous muuttaa soundia ns. välittömästi, sekä metelin puuttuminen, mikä mahdollistaa makuuhuoneäänitykset. livetouhuissa etu on siinä, että lähtösaundi on aina vuotovapaa ja sama, mikä taasen helpottaa miksaajan työtä.*
4. Uskotko musiikinkuuntelijan kuulevan eroa traditionaalisen ja digitaalisen välillä?
 - *Keskivertokuluttaja ei huomaa varmasti mitään eroa vahvistimen ja modernin mallintavan välillä.*
5. Onko digitaalisessa maailmassa eroja miksaus näkökulmasta?

2(2)

- *Riippuu varmastikin lähteestä. Mallintavat tuppaa olemaan monesti yksiulotteisen kuuloisia, ja "liian" kliinisiä verrattuna mikitettyyn vahvistimeen, ja mallintavien yläpää kuulostaa monesti omituiselta, joten sitä pitää ekvalisoida/kaiuttaa ehkäpä hieman eri tavalla.*
6. Uskotko traditionaalisen vahvistimien äänityksen mikillä siirtyvän joskus kokonaan sivuun?
- *En usko.*
7. Mitkä ovat mielestäsi tärkeimmät asiat huomioida kitaran äänityksessä ja miksauksessa?
- *Äänityksessä ehdottomasti kitaran vireisyys, ja vaihekoherenssi, sekä mahdolliset lähiheijastukset, eli huoneen vuotosaundi mikrofoniin. Miksauksessa varmaankin se balanssi, jos kitara on äänitetty riittävän hyvin. Hyvin viritetty kitara kuulostaa yleensä hyvätä saundista huolimatta, kun taas huonosti viritetty ei kuulosta millään saundilla hyvältä.*

Appendix 2. Interview with Janne Tauriainen

1(2)

Date of interview: 22.02.2022

Interviewer: Juha Pöllänen

1. Käytätkö/oletko käyttänyt digitaalisia vahvistin pluginejä, tai profilereita työssäsi?
 - *Kyllä*
2. Mitä olet käyttänyt?
 - *UA Audio Ampeg, Kemper, Axe fx, Line6 ja Neural DSP*
3. Mitä etuja näet kitaravahvistin plugineissa ja kemper tyylisissä profile-reissa?
 - *Helppo ja nopea käyttää. Voi tehdä kotona. Ei tarvitse soittotilaa.*
4. Uskotko musiikinkuuntelijan kuulevan eroa traditionaalisen ja digitaalisen välillä?
 - *Jos mallinnuksen tekee hyvin niin en usko.*
5. Onko digitaalisessa maailmassa eroja miksaus näkökulmasta?
 - *Ylämiddlen sekä valmiiden kaikujen kanssa saa olla tarkkana.*
6. Uskotko traditionaalisen vahvistimien äänityksen mikillä siirtyvän joskus kokonaan sivuun?
 - *En, koska persoonallisimmat soundit saadaan edelleen parhaiten traditionaalisilla menetelmillä.*
7. Mitkä ovat mielestäsi tärkeimmät asiat huomioida kitaran äänityksessä ja miksausessa?

2(2)

- *Soittaja, soitin, laitteet ja signaalitie on kunnossa. Äänitystilanne on rento soittajan näkökulmasta. Koetetaan löytää jotain persoonallisuutta soundiin. Ei tuplata täysin samoilla soundeilla molemmille puolille stereokuvaa. Uskalletaan käyttää sekä high/low pass filttäreitä. Tarkkana alamiddlen kanssa.*

