Grooves in Numbers

The Influence of Digital Technologies on the Performativity of DJing

Bachelorarbeit

Studiengang Europäische Medienwissenschaft

an der Universität Potsdam

und der Fachhochschule Potsdam

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Potsdam, im Juli 2014

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# Abstract

The aim of this thesis is to analyze how digital DJ technologies have transformed the disc jockey’s craft and reshaped his identity as a collector, manipulator and presenter of music. An ethnographic approach is employed, based on interviews with established DJs from Canada and Germany as well as self-experience, which involves the production of DJ mixes with analog, digital and hybrid technologies. The resulting observations are supplemented with and contextualized by performance theory from the fields of ritual, theater and gender studies. Digital DJing is subject to controversy within the DJ community for facilitating certain aspects of the craft, which is perceived as a threat to its integrity. The thesis concludes that while the DJ’s musical, aesthetic and social identity has been reconfigured, his fundamental characteristics remain intact because performing and musical programming require fundamental skills that depend on human agency.

# 1. Introduction

This thesis aims to compare analog and digital DJ technologies with regard to the performativity of the disc jockey. The DJ has been historically underrepresented in academic discourse despite his cultural relevance. The human ritual of collective dancing to music is an ancient pillar of culture and society. The emergence of the DJ in the twentieth century constituted a detachment of this ritual from the performance of live music in favor of recorded music. His peculiar postmodern function as a “meta-musician” has exerted considerable influence on dance culture and the development of numerous music genres.[[1]](#footnote-1)

Traditionally, the craft of DJing has been bound to vinyl records, but recent technological developments have increasingly digitalized the profession, which has facilitated access for aspiring DJs such as myself, but also generated some criticism for “devaluing” the art of DJing. As a digital DJ who has always worked with DJ-software and a midi controller instead of turntables, I have attempted to learn to mix songs in the traditional way of using vinyl records over the course of this project. I have also explored Traktor Scratch as a Digital Vinyl System (DVS), the popular hybrid of digital and analog DJing methods which enables DJs to use turntables to play digital music formats via timecode vinyl. My goal is to examine how the aesthetic and technological options and challenges of these different systems affect the performativity of the DJ as a collector, as a “composer” and as a mediator between the world of music and the audience.

The thesis will be divided into a creative and a theoretical part. The project will involve the real-time production of at least one DJ mix with each technology to illustrate the aesthetic differences I will describe in the theoretical analysis. The essence of DJing is invariably attached to the live performance in front of an audience, which loses its unique atmosphere in any recording. Nonetheless, most DJs develop, practice and expand their skills in solitude at home before they display them in front of an audience, a process about which I will provide some personal insights. Additionally, the recording of mixes to distribute for promotional purposes has been a widespread practice among DJs for decades, whether on tape, CD or online. However, I will also draw on my experience from live gigs, which were mostly conducted with a Mixvibes U-Mix Control Pro and the corresponding software Cross DJ, except at one recent private house party, where I played a spontaneous vinyl set. Unfortunately I did not have an opportunity to use vinyl, regular or timecode, in the context of a club appearance.

To ensure a reasonable scope I want to remain within the boundaries of just one genre, and I have chosen to confine myself to hip-hop music for a number of reasons: Most of all, I specialize in hip-hop and funk, which make up the bulk of my music collection. As a loop-based genre, hip-hop is more DJ-friendly than funk and therefore more practical to learn beatmatching with. I also want to counterbalance the dominance of EDM (electronic dance music) in most general research on club culture. When hip-hop DJs are mentioned, the focus is usually on the art of turntablism, which originated in hip-hop culture but has become somewhat detached from the dancefloor and occupies a different niche than what I aim to investigate here. I am also excluding the aspect of production. Those kinds of hip-hop DJs are on another level – they are hip-hop *musicians*. Instead, I am restricting myself to the domain of the typical club DJ, the DJ in his essential, most basic function, as an archivist and performer, who plays a “collage” of songs or tracks, in my case hip-hop songs, by creating transitions through beatmatching or other methods.

In the theoretical component I will first explain the terminology I will be using, starting with the difference between analog and digital, followed by a tentative working definition of performativity as well as a brief history of the DJ to outline his essential characteristics and illustrate his cultural significance. Following this, I will compare the aforementioned technologies – vinyl, controller and DVS - with regard to the three central aspects of DJing: preparation, composition, and presentation. My experimentation with vinyl took place in a domestic practice situation almost exclusively, but based on existing research, interviews I conducted with other DJs and my own continuous general performing experience I will transfer my observations to the realm of live performance as accurately as possible.

First, I will analyze how the shift from vinyl records to digital music formats impacts the DJ’s work outside of the club, both in relation to what is colloquially referred to as “digging” – the constant search for and acquisition of new music – and concerning the preparation of the musical material that precedes every DJ performance. Secondly, I will describe the differences in how these technologies are used to produce a mix by arranging songs in a specific order while constructing transitions between songs through beatmatching. Thirdly, I will discuss the wider context of the performance as an event that is constituted by the interaction of the DJ, the technology and the audience.

Even though objectivity is now widely considered a utopian academic ideal that can never be fully achieved, this study takes on a comparatively subjective perspective since I am simultaneously the observer and the target of observation. While I strive to gain a certain degree of distance through my readings, interviews and elaborate self-reflection, I also ­­­­­­­­want to embrace the individuality of this experience, simply *because* every DJ is different. In order for my observations and conclusions to be more comprehensible and hopefully relevant, I will first provide some context concerning my development as a DJ.

My first DJ experience took place after I moved far away from my small town to attend university in Potsdam. In my second semester I followed an appeal to bring an external hard drive to the annual media studies summer party. That was when I first saw and used DJ software (in this case, Virtual DJ). With no prior knowledge about the program or any DJing experience whatosever - and the extent of the girl’s instructions being limited to “press ‘sync’ and slowly move this thing in the middle to the other side” - I jumped in at the deep end. I kept the small crowd dancing with an array of crowd pleasers along the lines of Michael Jackson and MC Hammer despite my blatant deficiencies, such as cluelessly syncing two tracks that were 20 BPM apart. I didn’t even know what BPM was.[[2]](#footnote-2) I got such a thrill out of seeing people dance to music I selected that I made sure to get a DJ slot at every subsequent media studies party.

I soon acquired Virtual DJ myself, which I used with just a mouse and an increasing amount of keyboard shortcuts for two and a half years, mostly making hour-long mixes for campusradio podcasts and experimenting with mashups (in addition to performing live at the semiannual media studies parties), until I finally bought my Mixvibes controller. The controller opened up a new world to me and over the years I started taking my DJing efforts more seriously, excessively cultivating countless playlists, thinking my selections through more than before, learning about bitrates and similar technicalities and getting small gigs through acquaintances. Eventually I teamed up with a like-minded friend and fellow aspiring controller DJ, who also played at the media studies parties and participated in campusradio, to initiate our very own funk-based party in Potsdam, which recently celebrated its relatively successul premiere. This was my starting position when I borrowed a set of turntables and a mixer to learn mixing with vinyl.

# 2. Clarification of terms

The purpose of this chapter is to outline the basic terminology I will be using throughout this thesis. I will start with the simplest one, analog as opposed to digital, followed by a brief explanation of the concept of performativity and finally a condensed history of the DJ that introduces his main defining characteristics.

## 2.1 From analog to digital: The DJ’s tools

The choice between analogue and digital is not a choice between reality and illusion; it is really a question of which illusion one prefers.[[3]](#footnote-3)

Philosophically speaking, every recording of sound is analog in the sense that it has a “relationship of analogy” with the original sound wave. The difference lies in how the analogy is created.[[4]](#footnote-4) Nowadays, the term “analog” is used to refer to electrical recording and playback, where sound waves are converted into a “voltage stream”, which controls the “inscription technology” that stores the information on the medium. Playback reverses the process, as the “voltage stream is re-created […] and turned back into mechanical energy by an amplifier,” the “mechanical energy” referring to the vibrations of the sound wave.[[5]](#footnote-5) This is what happens when a stylus moves over a vinyl record’s groove, which is essentially “a topographical reproduction of the waveform in three-dimensional space.”[[6]](#footnote-6)

Digital files, on the other hand, do not contain a physical, but virtual representation of the original sound wave. Here, the signal is converted into a binary code of ones and zeros, also known as bits. As opposed to analog recording, the representation of sound is not “continuous”, but “discrete”. This means that a digital file stores “’samples’ of an audio signal’s power at precise intervals.” The sample rate indicates the amount of “samples” defined within one second, in other words, the amount of information in relation to time. This information is, in turn, converted into electrical and finally mechanical energy as it emanates from the speakers.[[7]](#footnote-7)

The timecode vinyl that makes vinyl emulation possible contains an analog signal, “a long, high-pitched sine wave known as a control signal.” The control signal helps the computer interpret the user’s actions by sending “three basic bits of information to the software: record speed, record direction (backward or forward), and the position of the needle on the record.” The information is sent through an “analog-to-digital converter”, also known as an interface, which “sends digitized information on changes in the sound of the control record to the software,” according to which the digital sound file on the computer is controlled. This process enables DJs to manipulate digital files the same way as regular records by using two “blank” discs.[[8]](#footnote-8)

Controllers use MIDI technology to manipulate the digital music file playing within the software:

MIDI is essentially a communications protocol or common language that enables any MIDI-equipped electronic instruments to be linked together in a musically useful way. The data that makes this possible is in digital form, hence the acronym MIDI (Musical Instrument Digital Interface).[[9]](#footnote-9)

The interface elements on the controller contain “performance instructions” that correspond to the software’s individual functions.[[10]](#footnote-10) There are two basic types of MIDI signals: Buttons send so-called “note” commands - for instance, the “PLAY/PAUSE” button sends a signal to (de-)activate playback. Knobs and faders transmit “control change” messages for gradual progressions.[[11]](#footnote-11) While digital vinyl emulation systems are a hybrid technology that converts an analog into a digital signal to establish a connection between the turntable and the computer, MIDI controllers are a purely digital technology designed specifically to communicate with computers.

## 2.2 Performativity in performance, ritual and identity

The chimpanzees assemble by night in great numbers and then the carnival begins. One or two will beat violently on this dry clay, while others jump up and down in a wild grotesque manner. Some of them utter long rolling sounds as if trying to sing... and the festivities continue in this fashion for hours.[[12]](#footnote-12)

In the context of this study, performativity is to be understood on two levels. First, in the sense the word “performative” was first transferred from linguistics to cultural studies, it points to how actions constitute reality, processually and self-referentially shaping identities and cultural norms.[[13]](#footnote-13) Secondly, it relates to the conditions of the situation of the performance in the classical sense – to put it simply, an audience assembling at a specific time and place to witness a performance. Both of these frames will be filled with content over the course of this thesis, but I already want to elaborate a little on the latter to illustrate my point of departure.

Unfortunately, there is no such thing as a performative theory about the DJ. There are a number of possible reasons for this – the official performative turn of the 1960s and 1970s was too busy reversing the hierarchy between text and performance, a dichotomy that does not concern the DJ because there *is* no text underlying his performance.[[14]](#footnote-14) Ironically, this pure performativity may just be the reason why the DJ does not receive the same academic treatment as the “high arts” do. Poschardt perceptively argues that the “wordless” culture of the DJ simply does not lend itself to being forced into a theoretical corset. Instead, “the truth about DJs has to be experienced when you can watch the DJ at work and dance to his music.”[[15]](#footnote-15)

Even the realm of ritual studies, the emergence of which constituted a performative turn of its own in the early twentieth century,[[16]](#footnote-16) has ignored the DJ; he is probably the victim of a pessimistic view of the secularization of festival culture, which is apparently considered a “decline” by some scholars.[[17]](#footnote-17) The only people that consider club culture as a valuable modern-day response to the deep-seated human need for “holy time”[[18]](#footnote-18) are the people actually involved in it, those who are “worshipping life through dance and music.”[[19]](#footnote-19) In the meantime, city administrators are imposing curfews and noise restrictions to protect citizens from being disturbed by it.

While the DJ pops up from time to time in pop culture theory, most of what has been written about him as the central subject is historical and anecdotal, though decorated with occasional abstract musings, such as the poular “shaman” metaphor, which appears in Brewster and Broughton’s introduction to their extensive history of the DJ.[[20]](#footnote-20) However, in my research I have encountered numerous concepts surrounding ritual and theater that reminded me of the DJ, a lot of which I recognized in Adamowsky’s and Klein’s forays into club culture. After all, a club is a performative space, therefore a lot of parallels can be discovered with theater as well as ritual.

One of the universal characteristics of performative situations like rituals, theater plays and also dance club nights is the temporal and spatial separation from the everyday, including the suspension of its rules and social hierarchies, which provides the breeding ground for the exceptional experience of being part of a community, a “collective celebration”[[21]](#footnote-21) that enables the “leveling of all differences in an ecstasy that so often characterizes performing.”[[22]](#footnote-22) Creating a peaceful atmosphere of inclusion and equality has been a central aspect of the subcultures that owe their existence to the DJ, from disco to hip-hop to techno. This is accompanied by a specific corporeality that produces a transcendant state, an intense experience of the present and a heightened sense of self as mind and body melt into each other, which could be also be interpreted as “flow”.[[23]](#footnote-23) Another common theme is the dramaturgy of tension and release, which repeats itself in small fluctuating units throughout the event, but also constitutes the structure of the event as a whole in an Aristotelian sense: There is always a beginning, middle and end, or in DJ terms warm-up, peak time and cool-down.[[24]](#footnote-24)

All of this is made possible by the “bodily co-presence of actors and spectators [that] enables and constitutes performance,”[[25]](#footnote-25) whether the performance in question be an ancient rite of passage that transforms the status of a member in the eyes of the community or a theatrical performance that “infects” its audience with a “contagious” energy and passion.[[26]](#footnote-26) As far as the DJ is concerned, the audience truly *is* the performance.[[27]](#footnote-27) Without trying to dismiss the special relationship between actors and spectators in a theater, I want to point out the peculiarity of the dancing crowd in the club context, whose default mode is not “sitting down and watching” by any means. The roles are reversed: The DJ is rooted to the spot in his booth - it even used to be common for the DJ to sit down – whereas the dancers move across the space. Theater spectators “generate the performance” from a reception theory perspective and in some cases through genuine audience participation, but a DJ’s audience possesses an inherent power over his performance because of their ability to judge him immediately and visibly through the way they dance or don’t dance, which (ideally) influences his decisions.

## 2.3 The adventures of the witchdoctor on the wheels of steel: A brief history of the DJ

It is the DJ who presides at our festivals of transcendence.[[28]](#footnote-28)

In their extensive history of the DJ, Brewster and Broughton dive right in by tracing the role of the DJ all the way back to the ancient shaman who conducted the musical accompaniment at mankind’s nocturnal rituals.[[29]](#footnote-29) Though it may seem a far-fetched idea at first, on second thought it provides a useful metaphor. Western culture is undeniably no longer as deeply permeated by religion, and as a result our celebrations have become detached from their ancient function of worshipping the divine. Yet modern civilization has retained a deep-seated need for collectivity and transcendence. One of the figures who can provide such an experience is the DJ.

**Laying the groundwork**

The story of the DJ is inherently tied to the story of recorded music as well as radio. There was a time when the reception of music was physically bound in time and space to the production of music. If you wanted to hear music, you had to perform it yourself or be within hearing distance of someone performing it. Until, one day in 1877, Thomas Edison recorded himself singing “Mary had a little lamb” onto a wax cylinder as “the first human being to record a sound and reproduce it,” albeit without the intention of using his invention to store music.[[30]](#footnote-30) Around three decades later, Canadian engineer Reginald Fessenden became the world’s first DJ by transmitting a cylinder recording of Handel’s *Largo* via radio waves.[[31]](#footnote-31)

In fact, radio was the realm the DJ first conquered, already raising suspicion among musicians and politicians alike because of the power he held “as the gatekeeper at the point where music met its audience.”[[32]](#footnote-32) I cannot go into detail here concerning the development of the radio DJ, but it is worth noting the central aspects of the craft that the radio DJ established – besides of course the term “disc jockey”, which is surrounded by a variety of origin stories, but basically defines him as a craftsman.[[33]](#footnote-33) The DJ was characterized by his inherent advantage of being able to play more music more cheaply than any given live musician, as well as his function as a tastemaker and musical ambassador who can provide a platform for all the music that the world’s mainstream outlets are carelessly neglecting or deliberately suppressing. This ability has often put him in charge of the success (and later on even the creation) of entire genres, the first being rock’n’roll, which developed from 1940s rhythm and blues.[[34]](#footnote-34)

Recorded music found its calling as a medium of entertainment only a couple of years after it had been invented: Patented in 1889, the jukebox merely lacked the technology of amplification until it gained widespread popularity in the 1920s, conquering a variety of establishments such as saloons and cafés, so that “ironically, the DJ’s role was automated even before it came into existence.” Both music and DJ culture, each as an art and as an industry, owe a great deal to this machine. The jukebox not only kept record sales going in the Depression era, but also allowed for cheap and adventurous musical programming by the establishments’ proprietors, who determined the selection of their jukebox and thus were basically just one step removed from being DJs.[[35]](#footnote-35)

In an entirely different context, the early twentieth century witnessed a peculiar setting in which people gathered to listen to recorded music. Starting with the “tone tests” held for the Edison Diamond Disc Phonograph from 1915 onwards, new sound recording technologies were often introduced to a group of invited guests at staged demonstrations, not to dance and have fun but to be amazed by the “realistic” reproduction of live music. In this context the technology did not serve the purpose of enjoying music, but music was a means of experiencing the technology.[[36]](#footnote-36) However, Edison was also already interested in the effect the music itself had on the guests, intuitively formulating the essential concern of the future club DJ: to guide the audience’s emotions. He paid psychology professors to study the mood changes triggered by music, one of whom “developed a Mood Change Chart that Edison dealers were encouraged to use at Mood Change Parties, to show their ‘Analysis of Mental Reactions to Music, as Re-Created by the New Edison, the Phonograph with a Soul.’”[[37]](#footnote-37) *The Phonograph with a Soul*. A simple marketing phrase that carries so much baggage, considering the eternal accusation of technology threatening humanity, which has permeated the discourse surrounding not only the history of recorded music, but also the role of the DJ himself as well as the technologies he uses.

**The birth of the club DJ**

In 1943, the first official dance event based on recorded music had six couples dancing to a small selection of swing records in a small town in Northern England. This “Grand Record Dance” in Leeds, UK, was organized by “eccentric young entrepreneur” Jimmy Savile, who “hit upon the bright idea of playing records live, armed only with brittle 78s and a makeshift disco unit,” a home-made fusion of a gramophone and a valve radio. Unfortunately the party soon came to an end as the equipment “had melted at several soldered points and died quietly, but not before giving a final electric shock to its inventor, causing him to weep openly.’” Nevertheless, the club DJ was born that night - a downright revolutionary incident, because after all “transposing the idea [of the radio DJ] to a live format required a quantum leap of imagination.” Savile proceeded to successfully spread his alternative to live music events all over the country, confusing technicians by having them set up the record player on stage instead of in the lighting man’s booth and even adding a second one to reduce the gaps between records, which he filled with talking. Eventually, he launched a successful career in media as a radio DJ and the first host of *Top of the Pops*, making him the “first superstar DJ.”[[38]](#footnote-38)

While Savile was instituting the bandless dance in dance halls across the UK, American radio DJs in the fifties promoted their shows at so-called “sock hops” in high school gymnasiums, where guests had to take off their shoes for the sake of the flooring material. It didn’t take long for the concept to catch on, as amateur DJs emerged on the scene.[[39]](#footnote-39) Soon the first discothèques opened up in France, the UK, and eventually New York.[[40]](#footnote-40) The British northern soul scene emerged as the first rave culture and established the DJ’s duty to dig for rarities.[[41]](#footnote-41) Meanwhile in Jamaica, reggae was revolutionizing DJ culture unnoticed by the Western world by turning it into a genuine performance.[[42]](#footnote-42)

“In less than a quarter of a century, the idea of dancing to someone playing records had evolved from a bizarre experiment in a Yorkshire function room to an intricate world of nightclubs, DJs, drugs and music.”[[43]](#footnote-43) The thriving disco scene of the seventies solidified the basic characteristics of the DJ that had surfaced in the previous decade and have defined the craft to this day: The obsession with unearthing rare treasures, the art of mixing and beatmatching and last but not least, the skill of manipulating the crowd through the power of music.

In the late seventies, disco and most of all funk provided the bulk of the source material for the Bronx DJs that created hip-hop music. In a way it was the first truly postmodern music genre, the first to base its entire creative process on the rearrangement of building blocks from existing recordings. Fueled by dance, it was a purely DJ-driven meta-genre, an “*omnigenre*” that introduced a “genreless concept of music.”[[44]](#footnote-44) DJ Kool Herc was the first to reduce records to the drum breaks that he noticed certain dancers, the b-boys and b-girls, waiting for. Famous hip-hop pioneer Grandmaster Flash perfected the precise beatmixing that would become central to turntablism, while Afrika Bambaata stood out as an exceptional “digger” with his vast and eclectic music selection. The style of hip-hop DJs was soon transferred to the level of production, creating a new genre based on loops and samples, a sound that DJs first created.

The role of the DJ for the electronic genres that followed would exceed the scope of this chapter and is not especially relevant for this thesis, but I will provide further references in the appendix.

# 3. Fundamentals of DJing – analog vs. digital

In the following chapters I will examine the differences beween analog and digital DJ technologies ­­in reference to the performativity of the DJ. I will deal with the three basic categories of the club DJ’s craft: 1) The “outside”work of collecting and archiving music, 2) the techniques of mixing and 3) performing in front of an audience.

I am approaching the analysis both theoretically and empirically. In a somewhat ethnographic mindset, I have employed practices similar to those of an anthropologist’s “participant observation” which could in this case perhaps be summarized as “self-experience”. I have made myself the subject, instrument and object of observation:[[45]](#footnote-45) For the past few months, I have been teaching myself how to mix with vinyl records on a traditional setup of two turntables connected to an analog mixer.[[46]](#footnote-46) During this process, I have filmed some and recorded all of my practice sessions and kept a diary documenting my progress. After I perceived my skills to have reached a basic functional level, I planned and recorded a DJ mix. Following this, I proceeded to explore a Digital Vinyl System: I purchased a Traktor Kontrol Z2 (including the corresponding software Traktor Scrach 2), a device that functions as a DJ mixer, a DVS interface and a controller at the same time, thus uniting elements of both vinyl- and controller-based DJing. Using this technology, I produced a second DJ mix with the same selection of songs in the same order. Finally, I recreated the mix a third time with the midi controller I have been using for years.

I am not dealing with CD DJing, which was the first digital DJ technology, because it has never been embraced by hip-hop DJs, as opposed to the DVS. Additionally, because of the limited scope of this thesis, and for financial reasons, exploring CDJs was not an option. But even without them, enough insights about digital technologies can be gained through the controller. Lastly, exploring the motivations behind the invention of vinyl emulation provides a better understanding of the role of vinyl in DJ culture.

In addition to my own experiments, I conducted several interviews with DJs specializing mostly in funk, soul and hip-hop, two male and one female, who I know personally and who have been active much longer than myself. They all started DJing with records and eventually switched to a DVS – as I discovered, with various motivations and degrees of initial resistance. Two of them additionally used CDs to some extent before the DVS emerged, with mixed feelings. These two also regularly host radio shows at non-profit community radio stations. The interviews were conducted either in person or on skype. They were recorded and transcribed with minor cosmetic adjustments for the sake of readability.

My theoretical foundation consists of literature on DJ culture and performance theory. The former is itself often based on anecdotes and interviews or some form of participant observation. The latter stems from the fields of theatre and ritual studies and will have to be adjusted as I apply it to elements of the DJ performance.

Over the course of this thesis, I will uncover a lot of different skills, strategies and approaches, but it should be remembered that generalizations only apply to a certain degree because every DJ is different. A DJ’s personality obviously shapes his work as DJ – for instance, DJs with an exceptional sense of order or even organizational obsession might have more nuanced playlists than others. A DJ with a naturally calm character interacts with a crowd differently than a vivacious dancer type.

## 3.1 The DJ’s secret work: Developing a musical identity

Your job starts in the record store, not on the decks. Your worth as a DJ begins and ends with what’s on your shelves and in your bag. For every overpaid hour in a club, a good DJ spends days, months, and years picking out tunes and learning about music.[[47]](#footnote-47)

If the DJ is a modern-day shaman, the superior world he delves into and channels for his audience is not the world of gods or spirits, but the entire universe of recorded music.[[48]](#footnote-48) The human lifespan is barely long enough to listen to a fraction of the world’s virtually infinite and constantly growing music archive, therefore the DJ’s mission to “distil musical greatness” never ends.[[49]](#footnote-49) The product that the crowd receives on the dancefloor is the result of what generally makes up the bulk of a DJ’s work: a certain activity called “digging”. Although it happens outside of the performance itself, it is a highly performative process because collecting, listening to and getting to know music is what really shapes DJ’s identity before he ever steps in the booth. The facilitation of beatmatching through visual aids has refocused the importance of musical programming in the DJ’s skill triangle that I’m basing the structure of this thesis on.[[50]](#footnote-50) Digging, of course, is the foundation of programming – no digging, no music.

Technically, a DJ can keep playing basically the same set with minimal variation from a small music collection he barely cultivates, especially if he plays to changing audiences, but he would not be considered a “real” DJ by most of his peers. This is one of the many unwritten, but definitely not unspoken rules of DJ culture: a DJ must be on the constant quest for new music. “New” can mean “recently released”, but it can also refer to old music that might be new to the DJ and hopefully his audience. Like myself, most DJs are obsessive music collectors first, so digging is not a burdensome chore, but a natural instinct they can barely stifle. The desire to dig is part of a DJ’s identity. In fact, only a dedicated and regular audience would notice the same music being played repeatedly, and residencies are becoming increasingly rare.[[51]](#footnote-51) But the DJ also needs to keep it interesting for himself to avoid getting bored, which is not a good vibe to radiate onto a dancefloor.

Obviously, the more music a DJ collects, the more challenging the task of organizing it and distilling it into a set becomes. Digital music formats have revolutionized the way music is distributed as well as how it can be stored and filed. In the following chapters, I am going to examine how the internet has transformed the practice of digging and how DJs organize their digital as opposed to their physical music libaries.

### 3.1.1 Digging in the crates

I […] spent time searching for records to scratch and mix in record stores, thrift shops, library sales, and the homes of friends and relatives. DJs call this *digging in the crates*, the ‘crates’ referring to the typical way records are stored. As I discovered, it’s called digging for a reason – it’s tiring, hard on the back, and often leaves the digger with dirty hands. But it can also be hugely rewarding, and plays an important role in the education of DJs.[[52]](#footnote-52)

For his book about the hip-hop DJ, Mark Katz did some “lab” research as well, dabbling in scratching and mixing – but unlike myself, he did it from a non-DJ’s perspective. He names a lot of the typical places where vinyl DJs go hunting for records, but the most iconic one is definitely the record store. Before the internet, the record store was the DJ’s second home.

**Digging strategies**

The northern soul DJs in the UK were the first real diggers and gave digging its literal interpretation. To them, it actually meant digging up something “dead” from its grave – they “exhumed”[[53]](#footnote-53) not only a genre of music that no longer existed, but also the discarded work of unsuccessful victims of the entertainment industry. To this day, a passionate digger considers it a very serious mission to bring forgotten music back to life and give it another “chance to shine,”[[54]](#footnote-54) in the case of hip-hop *musicians* (turntablists and beatmakers) even by reworking it into entirely new pieces of music.[[55]](#footnote-55) Here is where my initial distinction between the kinds of hip-hop DJs matters to avoid confusion: The hip-hop DJ in the traditional sense digs for *fragments* of songs, and he does so within music genres that provide the *source material* for hip-hop beats. He digs into all kinds of genres and can make use of an otherwise terrible record as long as there’s a good break or sample on it. Conversely, a hip-hop club DJ like myself, who plays their *product* - ready-made rap records - understands digging like club DJs of all genres do: as finding good tracks that will work on the dancefloor. However, the basic mindset is the same for all DJs: to celebrate great music and to distinguish yourself from other DJs by finding things they don’t.

In my research I have discovered an elaborate history and culture of record digging that as a digital DJ, I was not previously aware of to this extent. DJs used to go to great lengths to protect their discoveries by covering up labels and sabotaging other diggers like Mario Kart players dropping banana peels in front of their opponents. For example, Afrika Bambaata used to buy useless records to lead astray other DJs who followed him into the record store to buy the same records he bought.[[56]](#footnote-56) Digging is a skill, and as such it is always associated with certain techniques that mutate along with the circumstances over time. A quick google search for “record digging tips” produces a sheer endless list of articles, blog posts and forum discussions going into incredible detail about how and where to find records – though largely directed at beatmakers looking for samples, most of them apply to club DJs as well. When you boil them down, the basic tips make just as much sense for digital DJs as they do for vinyl diggers:

1) Look in a variety of places, 2) know what you want, but stay open-minded, 3) orientate yourself by basic information: year, label, genre, musicians and instrumentation, 4) try to listen before you buy (or download), 5) make sure you’re getting good sound quality and 6) take the time to listen to and get to know your acquirements. On this abstract level, digital and analog digging follow the same basic principles. However, the two present very different experiences and challenges due to the emergence of the internet and the nature of the media themselves.

**Expanding horizons**

The two crucial conditions that affect digging as an activity are availability and storage. The former has been revolutionized by the internet and concerns not only virtual files, but also physical media. Online shops and platforms like *discogs*, where people sell records and CDs second-hand down to the most obscure rarity, have facilitated the acquisition of physical copies enormously. And of course digital music files can be easily purchased online at overall reasonable prices. The internet has democratized the production, distribution and consumption of music. By not going to the record store, one bypasses the store owner as a gatekeeper of music who limits the available selection. Additionally, producers and consumers alike are able to bypass an even more influential gatekeeper, the record company. Much like the increased flexibility and affordability of production equipment has created the “bedroom” producer, digital formats and the internet have created the bedroom *distributor*, as anyone with a computer, some audio software and an internet connection can upload their music, whether for free (e.g. *soundcloud*) or for sale (e.g. *bandcamp*).

Montreal funk DJ Ruby Jane cited access to a wider range of music as her primary motivation in switching to Serato, a popular DVS, because it enabled her to keep up with new music and play remixes only available digitally:

All convenience aside, the one thing that pushed me to going digital was the fact that there was so much new music out there. So many awesome remixes. I had no problem playing remixes or mashups. I love that stuff. Keeps things fresh! And I had no way to compete with DJs who were playing with Serato or Traktor if I was just gonna stick to vinyl.

The impact of this increased availability of music is amplified by the unprecedented and exponentially increasing storage capacity of both the sellers’ servers and the consumers’ hard drives. The size of an MP3 file of a four minute track amounts to approximately 10 MB at a bitrate of 320 kbps.[[57]](#footnote-57) One terabyte, the currently applicable size unit of external hard drives, can hold 100.000 of those tracks. Played back to back with no repetition, that roughly amounts to 6667 consecutive hours, or 278 days of music – three quarters of a year. A DJ with a weekly residency where he plays the entire night would take about 20 years to play every single song. However, this is only hypothetical, as most digital DJs don’t dip into their entire collection when they perform.

But it goes to show how today, a DJ’s digital collection is only limited to how much he manages to accumulate, which he can achieve faster and more conveniently than a vinyl DJ thanks to the internet, and because its size is completely detached from how much physical space it takes up. Still, one DJ’s vinyl collection can outnumber another DJ’s hard drive content. Jazzy Jay has over 300.000 records[[58]](#footnote-58) – ten times more than I have files in my music folder. I have a little over 200 GB of music (30.000 tracks), including a lot of things whose existence I am not aware of or which I have never listened to, which, in Professor Groove’s words, “doesn’t count.”[[59]](#footnote-59) This is because a DJ’s *actual* music collection is the one *inside his head*. It makes sense: You would not play something you’ve never listened to, therefore you might as well not have it. Whether played from a vinyl record or a computer, the actual sound waves need to travel through your ear to create a copy of the music in your brain. The music *becomes* music to you, becomes *real* to you, through the *performative* act of listening.

**The human factor**

Dr. Best, a club and radio DJ from Nuremberg with roughly 25 years of experience as a DJ, an all-rounder in all things funky who currently owns approximately 5000 records, but uses Traktor Scratch for DJing, fondly recalled his trips to the record store during our interview:

That for me is the absolutely negative aspect of this digital shit. I used to love it, going to the record store. At least three days a week I hung out in some record store. When I was in a different city, it was the greatest thing, checking out what kinds of record stores there were and what they had on their shelves. It was so much fun looking for new music. And there was this record store in Nuremberg, that was back in my day when I played breakbeats, they had a lot of that stuff. And it was always like this: It was clear the record shipments always came in on Thursday or Friday, so when you went into the store on Friday afternoon around half past three, there was a DJ-gathering, because all the DJs from Nuremberg were stocking up before the weekend. There was this social component. You really knew all the DJs in Nuremberg by name. You talk for a bit, then you listen to some records, talk some more and also exchange tips and so on. And that has disappeared because I look for my music online now, alone at home.”

Meeting at the record store was a weekly ritual that brought together a tight-knit community – and this phenomenon was not exclusive to Nuremberg.[[60]](#footnote-60)

I, on the other hand, have always been a “lonely” digital DJ. I know some DJs through other connections, but I am not automatically participating in any DJ community just by collecting music. For Dr. Best, this circumstance not only mattered in terms of enjoying each other’s company and exchanging small talk, but also in terms of casual networking, a useful side effect of the record store gatherings:

I’ll say there were about 80% DJs, buying their records on Fridays and Saturdays. Everybody knew each other. And back then a lot of DJing opportunities arose as a result because of this record store, because you were standing outside talking and it didn’t matter, the barriers you usually have, like “well they’re more in the house scene and I’m in the breakbeat scene”. So it happened often, that you’d be standing outside of the store smoking and some house promoter would say “hey man, I’m still looking for something for the second floor, something different, not just more house, and you do breakbeats, right? You feel like doing it?” So a lot of DJ gigs came out of that exchange at the record store, which has died out today. At least to that extent. Unfortunately.

In his case, there was a direct causal relationship between the act of digging and the actual performance, which would not have taken place if it weren’t for the limited availability of the music. Every DJ was forced to leave his home to acquire new music. The record store functioned as a bottleneck, an anchor point where all the DJs’ paths crossed to form new alliances. In my case, the act of digging has never produced an opportunity to play somewhere. I get my gigs through friends and acquaintances who are involved in an event in one way or another and recommend me.

The aforementioned elimination of the store owner as a gatekeeper also has its downside: Record store owners and clerks, at least in a good store, know their collection well and cater to a certain taste. When you come in regularly, they will often make useful recommendations or set aside new releases that might be interesting to you. Digital DJs can compensate this to a certain degree with algorithms based on overlaps with other listeners’ tastes, but in the end, a computer can never achieve the necessary empathy and emotional receptivity to music. Dr. Best told me he actually has to invest *more* time digging online to discover something obscure than he used to in the record store because the online shop has *everything*, so he can easily spend five to six hours following recommended links and prelistening “music music music” until he comes across something worth keeping.

In conclusion, the internet and the computer have had an enormous impact on the act of digging as an act of “performative constitution of identity” similarly to how it is understood in the field of gender studies. Identities are not static or fixed, they are constantly evolving as individuals enact certain possibilites under the influence of the society or collective they are surrounded by.[[61]](#footnote-61) By staying at home and digging online, DJs are increasing the variety of possibilities (tracks) while reducing the influence of the community on their musical taste. Thus, the process of building a musical identity has become more individualized.

### 3.1.2 Listening, archiving, engineering: The DJ as an administrator

The new challenge of the digital DJ is keeping up with massive amounts of data. After all, with great freedom comes great responsibility.[[62]](#footnote-62) It’s easy to download the entire discography of James Brown in a matter of hours, but merely possessing music does not automatically make this music useful, let alone make anyone a good DJ. Developing an ear and a feel for music takes years, no matter which medium the music comes from. As Dr. Best pointed out:

Today, with this digital DJing, any 18-year-old can load his hard drive full of funk and soul on a Saturday afternoon. You couldn’t do that with records back then. And that’s maybe the point where I can distinguish myself, because I have experience. Because I used to DJ seriously in different genres, I got a different feel for it. He may have a full hard drive, but the question is if he can really handle the music seriously. You have to feel the music, and just because he- I don’t think that’s possible. So I think that’s the kind of thing where you can distinguish yourself today, when you mix across genres, from old to new music. That’s a unique style that maybe not everyone can imitate.

This experience with DJing and knowledge of music are crucial factors in maintaining a digital music library, because you listen more efficiently. The better you understand musical styles, structures and textures, as well as how music influences the energy level on a dancefloor, the quicker you can judge a track, an artist, or a label. If digital DJs want to take advantage of the ability to collect more music, they correspondingly need to either spend more time listening to music overall or dedicate less time to individual tracks for it to make a difference in their programming. Keeping up with a digital collection is a constant uphill battle, because it’s nearly impossible for most DJs to avoid accumulating files they don’t get around to listening to. Not all digital music is acquired with a great deal of consideration and careful choosing, partially because it is cheap and sometimes even free - whether through promotional releases, free downloads from independent artists, or “donations” from friends and DJ colleagues (an area with differing shades of grey in different countries concerning legality).

Processing and maintaining the material

The journey of digital music files from the vast archive of the internet to the dancer’s ear (and feet) passes through several stages of treatment, most of which are essentially the same for all DJs. New acquisitions arrive in some sort of unorganized pool, such as a folder. The next step is gradually working your way through them by listening to them, evaluating them and organizing them into broad categories, usually genres (Ruby Jane uses dance styles). Most DJs delete music they don’t expect to want to use. Vinyl collectors are no strangers to having to listen to excessive amounts of music at a time and discarding a lot of it – just look at the record store basement where DJ Shadow goes digging.[[63]](#footnote-63) However, they rarely run the risk of taking home loads of unidentified, completely unfamiliar records unless they buy crates of used records from someone, or get extremely carried away in dollar bins. But that is not standard procedure. The tendency is clear: with vinyl digging, there is a different ratio and chronology of listening and acquiring.

As I pointed out in the previous chapter, the most important preparatory task of a DJ is to listen to music, irrespective of the technology one uses. However, the music has to be organized in a way that is easily accessible for the DJ during a performance. Because virtual files can be easily categorized and even duplicated on various levels with playlists or a “gigantic folder system”[[64]](#footnote-64), digital DJs can go more into detail when organizing their music libraries than vinyl DJs, who basically have to categorize their music mentally. Both media are accompanied by different treatments – audio files are categorized, “tagged” with metadata and analyzed by software, whereas vinyl records can be marked with stickers, have to be packed in a bag each time and occasionally require cleaning or replacing. Likewise, the respective playback devices have their own maintenance processes attached to them – either software issues or mechanical and electronic repairs.

Either way, every DJ is automatically a kind of engineer. This requires research and resources, both of which the internet now provides relatively easy access to. The internet has spawned a different kind of social network for DJs: advice can be easily found through search engines and discussion forums. Before the internet, knowledge was passed on within smaller circles. Ruby Jane was taught how to go record digging by a fellow DJ she was friends with, while I did a simple google search to find the same information. Through the internet, the DJ community has become more individualized and more globalized at the same time.

## 3.2 The battle of eyes and ears: Composition techniques

I had a guy at a party one time come over to me and he’s like “Oh, you’re using Serato, not a lot of people use that.” And I actually didn’t even bring my turntables, I was just using my laptop that day, 'cause it was a house party. […] But anyway, he came up to me and he's like: "Where's your sync button?" And I was like: "What do you mean?" He's like: "Well how do you adjust the pitches so that both tracks are beatmatched?" I'm like: "I'm doing it manually." He's like "*WHAT?!*" *(laughs*) He didn't know that people did that. […] I'm like: "I'm old school, guy". And the funny thing is *I* didn't even know that it existed! So *he* didn't know that it didn't exist, and *I* didn't know that it was possible to have that.[[65]](#footnote-65)

Mixing means creating seamless transitions between two consecutive tracks by leveling their tempo to the same BPM value and aligning the beats so that when you fade from one song to the next, the tracks merge into a temporary mashup while playing simultaneously. This technique generates a non-stop flow of music that keeps the dancers going without interruption. It is generally considered a required skill for a DJ, even though there are (and alwas have been) plenty of excellent DJs who could not or chose not to do it. Ever since it first emerged in the disco scene, a variety of technologies have simplified this practice a great deal, each one of them triggering similar patterns of unfavorable reactions from purists.

In the following chapters, I will relate my own experiences with the different technologies and discuss why computerization constitute a shift in technique that goes beyond facilitation, despite being perceived as a threat to the DJ’s identity.

### 3.2.2 The science of beatmatching

Back in the day when I had my friend tell me “count out the beats” I was like: “How is math gonna get me to be a good DJ?” It’s not like I can count it and then compute as I’m mixing that this is faster than the other. […] But if I moved my hips, I could tell that one song was off-beat, you know? Like taking the time to feel it in my body. It’s something that’s internal. And relying on software to beatmatch doesn’t always help you understand the nature of the rhythms.[[66]](#footnote-66)

In this chapter, I will compare my experiences with analog and digital technologies in terms of mixing. My learning process is documented in detail in the “Vinyl Diary”.[[67]](#footnote-67) The purpose of this chapter is to summarize my conclusions based on the most important details. For the sake of brevity I will not distinguish between individual programs or between the controller and the DVS. Instead, I will focus on the basic functions of all DJ programs that constitute the biggest difference to analog DJing. The implication is not that a controller and DVS can be used in the exact same way or provide the same experience.

**Metaphorical brain surgery**

When I started learning to mix with vinyl, I knew I would have to rely on my ears instead of my eyes. I was used to seeing the waveform of both tracks running parallel to each other, indicating whether or not the tracks were matched up. Cross DJ and most other DJ programs create a so-called beatgrid for each track, marking beats and bars. However, this is not always reliable. The crucial elements are the parallel waveform display, which allows for visual beatmatching through aligning the corresponding peaks, and the BPM analysis. Using vinyl, I would have to learn a completely new skill and that would take a lot of practice. I basically knew how mixing with vinyl worked, it was “only” a matter of making my body do it. I started out mixing back and forth between a few instrumental hip-hop beats. Basically, it is a learning process on two levels, cognitive and physical. The cognitive element involves “rewiring your brain”[[68]](#footnote-68) to be able to discern a number of factors in a specific order:

1) Are the tracks matched up or not?

2) If not, is it due to mismatched tempo or misaligned beats?

3) Which track is faster or ahead of the other?

The physical component concerns the dexterity required to react to these observations, or in my case, to compensate for my lack of cognitive ability by answering those questions through repeated trial and error. My technique was to capture the snare drum by holding and rewinding the record, then letting it go in time with the other snare. Each time I adjusted the pitch faders differently and wrote down the values that seemed to come close enough. The fact that changing the tempo also alters the pitch took some getting used to, considering that software is able to separate those two parameters.

**Cue points & looping**

The step from instrumentals to regular tracks brought new complications, such as having to anticipate suitable points of transition within the track structures. Because I had to rewind the cued-up record manually after every trial run in my headphones, I soon missed the computer’s ability to loop the beginning of a track and/or jump back to the initial cue point with the push of a button. Looping is arguably the greatest improvement of DJ software as far as mixing is concerned. It automates an extremely difficult technique that involves two copies of the same record – looping two vinyl records at the same time would even require four turntables and two very well coordinated DJs.

My interview partners all expressed appreciation for the possibility of repeating parts of songs, especially for less “DJ-friendly” tracks with short intros and outros. I often use it to match up tracks early and sprinkle snippets of the upcoming track throughout the active track, or simply to enjoy myself listening to the mashup in my headphones between transitions. Matching up tracks in advance has the added benefit of freeing me up to equalize transitions in creative ways, although it can lead me to forget about disabling the loop after the transition. The ensuing monotony can quickly suck the energy from a dancefloor. Professor Groove likes to point out how important it is to structure transitions so that exciting parts follow each other without a drop in energy in between. In DJ software, the size of the waveform is a useful indicator for the progressing density of a track, but you still need to understand the typical 16-bar patterns.

Learning to mix with vinyl has not been simple, and I am still far from doing it with ease. I managed to record a carefully planned mix in one take, but making clean transitions spontaneously and consistently will take a lot more practice. For a long time, I could only sync tracks through a long process of trial and error by randomly adjusting the pitch and starting over. After a few months, I slowly developed an intuitive ability to discern which track was slower, as I started to feel a “natural” urge to accelerate the track that was lagging behind and became comfortable fine-tuning more dynamically by correcting the tempo while the tracks were playing. All superficial disputes within the community aside, Ruby Jane makes a good point when she says that DJs benefit from learning to beatmatch by ear, not because it’s difficult and will generate recognition from other DJs, but because it helps you “understand the nature of the rhythms.”

Therefore, manual beatmatching is indeed a valuable experience for a digital DJ like myself, because as I discovered, learning to rely on my ears instead of my eyes has improved my controller skills and redefined my relationship with the device. Even though I have rarely used the infamous “sync”-button for practical reasons, I still depended on the waveform and BPM display. The latter can be trusted with hip-hop, but not with music that involves a live drummer and/or complex rhythms, such as funk. No software can keep up with that. As a result, I never attempted to beatmatch that kind of music and resorted to doing a quick blend at the end of a song. If I could not lean on the precision of the computer, I preferred not to risk anything. But now, mixing funk is no longer an insurmountable barrier that I do not dare approach, it has become doable. I still rely on the parallel waveforms to some extent and I could not do it as well with vinyl. But the comfort zone of my controller has expanded: I no longer shy away from matching the tempo myself, even if only approximately, and improvising adjustments using the jogwheels, which I rarely touched before. Generally, I am much less afraid to ignore the program with the same attitude I put on when I disable spell-checking.

### 3.2.3 The art of mixing

The issue at the core of the controversy surrounding digital DJing is the very humanity of the DJ himself. This discourse follows a long tradition of cultural pessimism. Ever since the Industrial Revolution, mankind has had an ambiguous relationship with technology. On the one hand, civilization has been fascinated by it and enjoyed its benefits, if not downright defined itself through it. Progress is the imperative of the modern world, and technological advancement is the most lucrative kind. On the other hand, there is a deep-seated fear of being dependent on the machines we’ve built. In the world of DJing, any technological assistance can be considered “cheating” because it allegedly compromises his authenticity by redefining established DJ practices and his virtuosity by reducing the risk of failure.[[69]](#footnote-69) However there is a fundamental flaw in such considerations:

Essential to such arguments is an unstated warrant: musicianship is a matter of human skill, a *techne* in the classical Greek sense, a creative practice, that nevertheless seems corrupted by the influence of technology. This warrant presumes a clear opposition between a human *techne* and an inhuman *technology*; ultimately, its advocates assume that it is acceptable for humans to enlist the assistance of technology to achieve some goals but not others.[[70]](#footnote-70)

This notion constitutes a fundamental “category error” that can only lead the controversy in endless circles until it makes a mockery of itself.[[71]](#footnote-71) The “acceptable” balance between the human and the machine can only be defined arbitrarily and pointlessly, and this ideological dichotomy could easily lead one to questioning the existence of the DJ himself by asking: “Why is it acceptable to play pre-recorded songs in the first place?”[[72]](#footnote-72) The machine is not the DJ’s enemy, on the contrary, DJs have always excelled at exploring the different creative possibilities of various machines.

Understanding musical patterns, and perhaps even more importantly, *styles*, is a fundamental DJ skill necessary with every technology. This is why the skill of manual beatmatching should not be overrated. It may take a while to learn, but ultimately it is a science, not an art.[[73]](#footnote-73) Creating a mix is about more than just syncing tracks, because any random track combination does not automatically sound good simply because the tempos are the same. First of all, it has nothing to do with evaluating whether two tracks are a good match - stylistically, structurally, harmonically, rhythmically, even emotionally. This is the foundation for good programming, which I will deal with in the last chapter. Second of all, it takes experience and a good ear to judge *when* to make a transition and *how* to make it. There are a lot of options: quick cuts, short blends, prolonged layering, sometimes coupled with complex equalizing.[[74]](#footnote-74)

In the documentary *Scratch*, legendary turntablist Qbert refers to his array of scratches as a “vocabulary”.[[75]](#footnote-75) The same applies to transitions. Because digital DJs have a much bigger and more diverse assortment of options at their disposal, they face a host of new challenges in building and navigating their “vocabulary”. As far as aesthetic possibilities are concerned, a DVS provides the same elements as regular vinyl, while adding a plethora of additional functions a DJ has to familiarize himself with and learn how to combine and utilize. The user manual for Traktor Scratch Pro 2 is 370 pages long. I can only reiterate what I said about digital digging: With great freedom comes great responsibility. A lot of the processes that computers automate end up generating new challenges for the user, which means digital DJing is not necessarily *easier*, just *different.*

It is understandable that a DJ who spent months learning how to beatmatch with vinyl resents another DJ who bypasses this learning process and presses a button to achieve the same, but this perspective

privileges one particular technical skill, matching tempos, over other skills that have been developed by CD DJs and controllerists. So-called ‘buttonistas’ may not be matching beats by ear, but they have demonstrated an impressive array of new skills and tricks that are simply not possible using traditional DJ gear. […] They just run the risk of failing at something other than syncing beats.[[76]](#footnote-76)

Aside from these political quarrels that Dr. Best aptly referred to as a “DJ kindergarten”, the resistance against some digital technologies is rooted in simple vinyl fetishism. But it is also a matter of muscle memory. It is no coincidence that the EDM scene largely embraced CDs while hip-hop DJs could only be convinced of “going digital” with vinyl emulation systems, though not without a good deal of initial hesitation. Vinyl is a fundamental building block of hip-hop culture because it “was present at and largely responsible for the birth of hip-hop,” so it “carries with it the whole history, the DNA, of hip-hop.”[[77]](#footnote-77) Furthermore, a hip-hop DJ is used to a specific “immediacy and tactility”, his internalized gestures are programmed for vinyl.[[78]](#footnote-78) In the end, the DVS gained acceptance because it “allows DJs to keep what they love about vinyl – its feel, look, and authenticity – and avoid what they don’t love about it – its weight, cost, and inconvenience.”[[79]](#footnote-79)

A lot of DJs have an intense attachment to vinyl, to the extent where it becomes a part of their identity, which they attempt to preserve and consolidate by distancing themselves from others. Katz recounts how famous DJs were the first to embrace digital vinyl emulation systems for their convenience when touring internationally, helping them gain acceptance within the community, or at least a begrudging tolerance.[[80]](#footnote-80) Farrugia and Swiss offer a plausible explanation for this mechanism:

Superstar DJs have less to lose because they have already proven themselves to others in dance music culture—they have a certain amount of subcultural capital, and their positions no longer rely entirely on their knowledge, networks, and record collections. But for those without much capital, gate-keeping practices such as those we have described are a primary means by which they establish their expertise, the boundaries between themselves and others.[[81]](#footnote-81)

Being able to choose between a variety of technologies has added another facet to every DJ’s identity. Whether he wants to or not, by choosing a technology he situates himself at a specific point within this discourse and subjects himself to potential judgments from other DJs, even if he has no desire to participate in the discussion.[[82]](#footnote-82) Thus, digital technologies have broadened the spectrum of the DJ’s identity.

## 3.3 What you hear is what you get: DJing as a spectacle

The DJ is not the source of the experience, but one among several nodes in a cluster of sounds, technologies, and bodies moving through space. The creative subjectivity at work comes not from the human agent alone (nor the machines, nor the dancing audience) but from the interactions among them all.[[83]](#footnote-83)

The passionate resistance digital DJ technologies encountered (and sometimes still encounter) have been well documented by scholars of DJ culture, who have found countless examples of sceptical vinyl purists complaining about digital DJs appearing to be “playing pac-man” or “checking [their] emails” while possibly playing pre-recorded sets and essentially “getting paid to do nothing.”[[84]](#footnote-84)

This discourse implies a fundamental concern with how the DJ’s performance is perceived. There would be no reason to even care what other DJs do unless the very prestige of the art of DJing was at stake. The previous chapters addressed the DJ’s work outside of the club and his composition techniques. The following chapters deal with the role of the different technologies in shaping the *appearance* of the DJ’s performance and his interplay with the dancers. Performance theory will provide a theoretical framework that I will filter through the lens of my experience.

### 3.3.1 The ecstasy of things

Analog turntables leave the record in plain view of spectators, foregrounding the spatiality inherent in the technology of the record. Digital music in play, however, is largely or totally invisible […]. A number of [DJs] argue that visible recognition of the playback process is vital to the art of DJing.[[85]](#footnote-85)

My primary motivation to learn using vinyl was an inferiority complex. It took a long time, at least three to four years overall, for me to consider myself a DJ more comfortably after I had acquired a set of skills that every DJ needs, digital or analog. Yet against all rationality, I still felt like a second-rate DJ whenever I was the only one in a line-up not to use the turntables. I would free up a small space for my laptop and controller on the side, and the entire time I was playing I felt dwarfed by the silent, majestic turntables staring at me from the side, subliminally ridiculing this *toy* I was using in their stead and reminding me of a bigger challenge I had not faced – literallybigger. My controller is half the size of one turntable. But their *presence* was not just an intimidation, it was also an invitation. They fascinated me, they drew me towards them, they dared me to touch them and bring them to life.

**Turntables**

I used the word “presence” here for a reason. “Presence”, or “presentness”, is an aesthetic quality ascribed to performance in the discourse of theater studies. It refers to an intense, contagious energy circulating in the performance space that affects the spectators.[[86]](#footnote-86) Fischer-Lichte interprets this effect on several levels, but one context is particularly interesting concerning the turntable. Drawing from Boehme, she suggests that all performative spaces have distinct atmospheres, which are created by a configuration of things and people emanating a tangible energy, or “presence”. The concept is basically a remix of Benjamin’s aura. In reference to objects, not humans, Boehme specifies the term “ecstasy”. It means that in a performative context, an object affects people beyond their mere audio-visual perception of it: “In their state of ecstasy, things have an immense effect on anyone perceiving them because they appear as particularly present.” An object’s form “practically radiates into its environment,” its volume and dimension “can be felt from without, they bestow weight and orientation on the room in which the thing is present.”[[87]](#footnote-87)

The turntable certainly “pours” a lot of presence into a room through its physical properties. I want to supplement these abstract notions with a few concrete observations about the turntable. The simplest of them is to say that a turntable setup is an eye-catcher. If the DJ is a shaman or witchdoctor or priest, the turntable is his shrine or altar. It draws attention to itself with its sheer size and obvious sophistication, a heavily built body crowned by a delicate apparatus and hypnotically rotating shiny black disk. The point of contact where the sound medium meets its playback device is exposed, visualizing an obvious causality.

This is not just due to the equipment’s size. Turntables trigger specific associations. Because they are the machines that DJing was built on, they are imbued with historic significance. They have shaped the aesthetic of the DJ’s performance, even the definition of what DJing is. DJs used to have no other choice but to play records, so records accompanied the DJ’s rise to stardom. For a long time, DJing was not even a visual spectacle. It was common for the DJ to be hidden from sight in his booth - until he became the rock star of dance music.[[88]](#footnote-88) Consequently, “it is the turntable that has become the central ‘tool’ of the DJ and that has achieved a wide degree of cultural recognition, in much the same way as the electric guitar is perceived as being integral to rock music culture.”[[89]](#footnote-89) A turntable *transforms* a space by defining it as a DJ’s space, and by using it a person validates themselves as a DJ.[[90]](#footnote-90)

**Digital**

Now that I have divided the turntable’s “ecstasy” into its physical appearance and the meaning ascribed to it, the question arises as to how the controller and the DVS relate to those categories in combination with the laptop. Let’s examine the tool that unites them first. First of all, the laptop is small – small enough to fit on a person’s lap, as the name says. It is compact, its components hidden in a smooth, solid frame. As a thing in itself, it radiates a rather blank, nondescript vibe. Second of all, it is a multifunctional device so ubiquitous in everyday contexts that no one can be expected to be struck with awe by its appearance. While people who are not DJs do not have turntables at home and only see them in specific situations, almost everyone has a laptop and use it on a daily basis. Its ordinariness and familiarity results in a lack of fascination with it. Furthermore, its user interface is monodirectional, so anything unfamiliar and potentially fascinating that might be happening on the screen is concealed by the back of the lid. To see what a laptop DJ is doing, one has to trespass into his territory, which some curious guests do when the booth is not too demonstratively elevated or walled off.

As opposed to a turntable, a controller is not an autonomous playback device, it simply controls the actual playback device, the computer. Structurally speaking, it is no different from a video game controller. The gaming aesthetic becomes particularly obvious when comparing the DJ controller to a *DJ Hero* controller, which looks like an extremely simplified version of it, featuring a jogwheel and a few colorful buttons.[[91]](#footnote-91) Watching someone play a video game primarily means watching what happens on the screen, not the person operating the controller. Taking this analogy to an extreme, one could imply that the controller DJ offers no spectacle whatsoever because there is no visible causality between his gestures and the sounds coming from the speakers. The more there is for the DJ to see, the less there is for the crowd to see. One could wonder how a crowd would react to the DJ’s screen being projected on the wall - an interesting experiment I have yet to witness or conduct myself.

It is harder to analyze the controller’s presence or “ecstasy” because it is a relatively young phenomenon of the late 2000s that has just started to accumulate its own meanings beyond those of the re-contextualized devices that inspired it:

The controllerist […] may have started as a hobbyist, jury-rigging MIDI keyboards and gamepads for use as DJ controllers, but an entire industry of gadgets has since emerged, bringing to market a dizzying array of tools to give the DJ tactile interaction with computer programs.[[92]](#footnote-92)

As for the aspect of physical appearance, no statement can be made about *the* controller because there are many different types of different sizes. Some are almost as large as a set of turntables and are equipped with an impressive array of knobs, buttons and faders. Naturally, they draw more attention to themselves than their smaller and simpler counterparts. Earlier, I referred to my controller as a toy. In some ways, this is a suitable metaphor. Yet the metaphor is predominantly influenced by concerns of size more so than by a gaming aesthetic or toy-ish imitation of certain functions or properties. I would not call a controller eight times the size of mine a toy, let alone a DVS, even though “the moment you drop control vinyl on your deck, […] you’ve converted your turntable into a controller.” Because size matters, large controllers and especially vinyl emulation systems can “borrow” from the turntable’s ecstasy.

As Adamowsky remarks,

back then, when there were still live performances in clubs, the stage was the center that everyone homed in on. […] As opposed to the pop musicians on stage, equipped with a microphone and animating the crowd with their voices and bodies, the DJ disappears behind his technical equipment acting cool. Not himself, but his sound system is the eye-catcher, and this elaborate apparatus is a constant reminder of the technological expenditure the dancing pleasure is based on.[[93]](#footnote-93)

Although this is a rather simplified statement that ignores both the history of talking DJs and the modern DJ on stage - as well as the way a DJ’s behavior affects a crowd, which I’ll get to in the next chapter – there is some truth to it. Whether or not the dancers notice the DJ’s equipment consciously, it shapes the atmosphere in the room.

### 3.3.2 The audience is the performance

I think that [not looking at the laptop too much] is something that DJs should be conscientious of, because you don't wanna feel like the DJ is withdrawn from the crowd and just inside this electronic box the whole time. […] If a DJ doesn't seem like they're paying attention to the crowd, then you don't feel like it's a shared experience as much. You know what I mean? […] That's when a DJ- you feel like they're kind of in the wrong space. So it's not as fun anymore, whereas a DJ that you can see that they're into the music and they're enjoying it at the same moments as you are and they kind of look up at the crowd often enough, that they're like, "wow, we're all experiencing this together" then you can feed off their energy, they're feeding off of your energy, and there's just this kind of communication, I guess, or interaction. I think the essential part is just to feel like the energy's going back and forth between the DJ and the crowd.[[94]](#footnote-94)

For the early performance theorists, the DJ would have been an analytical goldmine, had they not been so focused on theater. While avant-garde theater was revolutionizing the “passive” role of the audience, which finally gained relevance in academic discourses, clubgoers were already way ahead of them. What happens in a club is performance at its finest; it is processuality, corporeality, spatiality, transcendence, energy, dramaturgy, rhythm, ritual, celebration, play. For every coughing guest in a theater, there’s a dancer in a club jumping up and down. The club audience takes everything a theater audience does to the extreme.

**Interaction with the crowd**

There are two ways a DJ interacts with a crowd: indirectly, through the music he plays, and directly, and through the way his body behaves. Since we’re already talking about performance theory, let’s begin with the latter. I have already mentioned that the DJ used to be hidden from sight, which is generally no longer the case. Now that his body is visible, it can’t *not* have an effect on the crowd, even if the space is decentralized because dancers can choose an “arbitrary spatial perspective”.[[95]](#footnote-95) As Professor Groove pointed out at the beginning of this chapter, a DJ’s enthusiasm is crucial to creating a “shared experience” where the DJ and crowd “feed off” each other’s energy. Without knowing it, he basically paraphrased Fischer-Lichte:

The “magic” of presence therefore lies in the performer’s particular ability to generate energy so that it can be sensed by the spectators as it circulates in space and affects, even tinges them. This energy constitutes the force emanating from the performer. Insofar as it animates the spectators to generate energy themselves, they will perceive the actor as a source of power. This unexpected energy flow thus transforms actor and spectator alike.[[96]](#footnote-96)

This does not necessarily mean jumping around and “doing wild arm motions and stuff as it seems like it's trendy to do these days,”[[97]](#footnote-97) it is much more subtle than that. It is about body language and facial expressions that convey enjoyment of the music and attentiveness towards the crowd. In my experience, technology is not the decisive factor when it comes to this. It could be argued that the laptop can constitute a “barrier between the DJ and the crowd” when placed at eye level.[[98]](#footnote-98) I have never seen a DJ’s laptop positioned above the mixer right in front of the DJ’s face – it is usually placed at an angle from the side, probably because most DJs are either aware of their visual impact on the crowd or simply want to be able to see the crowd.

Aside from the technology’s “aura” discussed in the previous chapter, it is the way the DJ *uses* it that shapes his interaction with the crowd. Digital DJs certainly “risk getting lost in their screens,” but it is up them to become aware of this risk and learn to avoid it.[[99]](#footnote-99) Staring at your equipment too intently is not an exclusively digital problem. A lot of vinyl DJs are completely absorbed in their activity, lacking the connection with the crowd. Ruby Jane admits to being a “stone face”:

I guess I’m concentrating and I’m thinking and I’m like: “Okay, what am I gonna play next?” I don’t really look like I’m enjoying myself. (*laughs*) […] I do look at the audience, but I’m observing them critically to see if they’re responding to the music. I actually don’t look that much at the laptop, I spend more time looking at the mixer.

She states that the laptop is not the culprit in this case, although she concedes that it “probably doesn’t help” and that it distracts her from interacting with the crowd when she plays *internally* on the laptop, without turntables as an external control device. Furthermore, as Katz remarks,

using digital vinyl can potentially free a DJ to interact *more* with a crowd [because] using a DVS means spending less time flipping through crates, switching records, and cueing them up, and more time gauging and engaging the audience.[[100]](#footnote-100)

Even a highly skilled vinyl DJ has to perform the physical action of turning around, picking a record from his crate and preparing it for playback. During mixing, it is also doubtful that a vinyl DJ is focusing on the crowd in the absence of a laptop, because beatmatching requires so much concentration that the brain blocks out the environment to a certain degree, and if he’s equalizing the transition he’s looking at the knobs on the mixer. Getting the next track ready and making transitions distracts a DJ from the crowd with all technologies. The degree of interaction with the crowd depends on his skill and the corresponding efficiency, but it is also a conscious effort. However, the “obvious physical movement” of a vinyl DJ presents more of a spectacle to the crowd while he’s busy.[[101]](#footnote-101)

Ironically, a controller actually requires less interaction with the laptop than a DVS, because all of the software’s functions can be operated from the device with the help of various buttons, faders, knobs or jogwheels. Conversely, a DVS forces DJs to touch the laptop’s trackpad or keyboard to load tracks, place cue points and activate loops, among other things. This is why some digital vinyl users, such as Professor Groove or myself, use a supplementary controller – or in my case, a compact combination of controller, mixer and analog-to-digital converter.

**Working the crowd**

The shaman’s journeys are neither gratuitous nor for private use. He goes to get something and he must deliver what he gets back to his people – he must teach them what he learns. His work is social work.[[102]](#footnote-102)

I don't think music is ever like an "eat your vegetables" kind of thing. I think a DJ that has that kind of mindset is not really going to connect with people.[[103]](#footnote-103)

Music is a powerful tool for steering people’s moods and emotions, and ultimately sometimes even their actions. Edison knew this when he came up with his “Mood Change Parties”, advertisers know it, store owners know it, filmmakers know it, therapists know it, and the DJ certainly knows, too. In the club, he has to translate his digging work into an unrepeatable experience, a unique musical journey that originates from a special feedback loop with the dancers in that place at that time. The crowd may be looking at the DJ or not, but they cannot turn away their ears. In a dance club, the volume level of the music ensures that it fills the room and envelops the crowd completely. With his music, the DJ penetrates every body in the room: “When a sound resounds in the listeners’ chests, […] they no longer hear it as something entering their ears from outside but feel it from within as a physical process creating oceanic sensations.”[[104]](#footnote-104) This is literally true for typical club systems, because the speakers are so powerful that the vibrations of the bassline physically impact the dancers’ bodies.

Generally, it makes the most sense to prepare a selection thouroughly, but flexibly. Vinyl DJs are forced to limit their available selection for the sake of transportability, whereas a digital DJ is automatically more flexible because he can have his entire collection at his disposal. Digital DJs generally separate their DJ music from the rest of their collection and categorize it to have easy access to the music they need at any given moment. Often they also create a playlist for an individual night to cater to a specific situation or to ensure a balanced rotation and maximize their collection’s exposure. Ruby Jane, who plays a monthly gig, has a Serato crate named “tonight” that she updates every time to make sure she rotates through her collection without repeating the same tracks too much. In a way, they emulate the way vinyl DJs pack their record bags, except that they have a safety net. This flexibility, combined with the democratization of digging, creates the “potential for a set to be generated that has a greater diversity and variety than a performance based solely on the playing of vinyl.”[[105]](#footnote-105) In addition, digital DJs have quicker and cheaper access to new releases.[[106]](#footnote-106)

**The DJ is not a jukebox**

Creating a dramaturgy for the night is a perpetual balancing act between tension and release, leading and following, preparation and spontaneity, pleasing and challenging. It is about controlling a certain group dynamic, because “the audience responds not only to the actors’ physical actions but also to the behavior of other spectators.”[[107]](#footnote-107) Performance scholars often describe the atmosphere in a theater as “infectious” or “contagious”. This phenomenon is what makes the DJ’s work possible. Since everybody has different musical preferences, a DJ cannot please every single person on the dancefloor. But if he keeps enough dancers going, others will be motivated to dance by the atmosphere.

The easiest way to please a crowd is by playing things they are familiar with, but it is pointless to base one’s programming on this realization. Brewster and Broughton’s DJ guide rightfully warns against the “big-tune syndrome”, which means playing “crowd pleaser after crowd pleaser” and “will wear out” the crowd.[[108]](#footnote-108) One of the biggest challenges for a lot of DJs, including myself, is fulfilling their function as a musical “missionary” and keeping a crowd entertained with tracks that are musically great, but that the audience is not necessarily familiar with. Professor Groove deals with the fact that the music he is “most enthusiastic about is not necessarily familiar to people” by finding the middle ground:

I spend a lot of time getting to know my music and understand which songs I have that, even if you have never heard it before, there's something in that song that is accessible and that makes you wanna move and makes you happy and all of that. […] It's not just familiarity with the song, it's also familiarity with a style, you know? Or a style of production or something. […] There's different aspects of a song that even aside from whether they know the song itself, it could sound more familiar or accessible or more strange and not something that they were expecting to hear. So that's just kind of where reading the crowd comes in.

The key to programming is understanding musical styles and how they impact the dancefloor, but predictions can only be based on experience. In their guide to DJing, Brewster and Broughton emphasize how every tracks sounds different on a club system as opposed to a home stereo, and how a track can affect a crowd differently than they affect the DJ himself.[[109]](#footnote-109) Only through “playing out” and remembering different crowd’s reactions to every track can a DJ start to build a mental “library of moods”.[[110]](#footnote-110) Digital DJs have the option of creating playlists based on mood, attributing characteristics to tracks in the “comments” column of their browser, or marking them with stars or similar grading systems various softwares offer.

This goes to show how much power crowds have over a DJs. A crowd doesn’t just influence a DJ’s present decisions based on an immediate feedback loop, but actually impacts his *future* programming. Every crowd a DJ experiences shapes his musical identity, one that is never static, but constantly shifting. Of course, this is not a one-way street. Step by step, the DJs of the world likewise influence the tastes of the crowds they entertain, to the point where they collectively shape new genres and subcultures because of their “direct impact on the music that participants in the scene are exposed to.”[[111]](#footnote-111) This is why the world of dance music depends on DJs to make adventurous programming decisions once in a while, even if they have to “struggle against the power of ingrained listening habits.”[[112]](#footnote-112) Professor Groove explains how this needs to be done by earning the trust of the crowd first, instead of forcing it on them:

I don't think music is ever like an "eat your vegetables" kind of thing. I think a DJ that has that kind of mindset is not really going to connect with people. […] Sometimes when I have a good feeling about the crowd, I put a song on that's maybe a slightly different direction and the energy dips. But I know this song builds, and it may take them a moment. It's not so bad that they're gonna suddenly clear off the dancefloor, I'm confident with that. I know that it's gonna take a moment for them to get into sync with this new thing but when they do, it's gonna be like a new direction and I know they’re gonna feel it and then we're gonna be able to go off in this other direction. If you can do that, that's when the crowd really begins to trust you, too, because you've given them something that was a little bit unfamiliar, and then they realized how amazing it is, and then the next time you throw something in they’re more like: "Okay, I'll go with this. Let's see where he's going with this”

This is a part of what makes clubbing a “liminal experience”, a term theater studies have adopted from ritual studies that describes how a performance is “capable of transforming the experiencing subject,” which is “of pivotal importance to the aesthetics of the performative as it captures the nature of performance as an event.”[[113]](#footnote-113) Both the DJ and his audience are exposed to new impulses in a constant state of negotiation. Each “transitional moment is accompanied by a profound sense of destabilization” until a balance is restored temporarily, only to be challenged again.[[114]](#footnote-114)

respond more quickly and flexibly to crowd

# 4. Conclusion: Music is the key

You’ll be surprised how much easier it is to improvise when you have real-life dancing bodies in front of you. Have some fun. It’s not an exam. No one’s judging you on your trendiness or your amazing pyrotechnical mixing gymnastics. They just want to dance.[[115]](#footnote-115)

In this thesis I have analyzed how analog and digital technologies shape the DJ’s performance and identity in different ways with regard to the three criteria that define his work: building and maintaining a music collection, mixing tracks together and performing in front of an audience.

First, I explained the basic strategies of acquiring music, or “digging”, that all technologies have in common. The most important one is the act of listening to music, which generates a mental music library and constitutes the foundation of a DJ’s musical identity. I described how the external circumstances of digging have shifted due to the internet and the increased storage capacity for digital music files, which has resulted in a democratization and globalization of the digging process and has also enhanced the individuality, variety and flexibility of DJs’ musical styles as they are less influenced, but also less supported by local communities and traditional gatekeepers.

Second of all, I outlined the controversy surrounding digital technologies within the DJ community, the central theme of which has remained the same since the invention of sound recording: the erroneous claim that technology is a threat to humanity because it automates actions previously performed by humans.[[116]](#footnote-116) In the context of DJing, the most “endangered” skill is perceived to be that of manual beatmatching. My aim was to clarify that syncing tempos is only a small technical aspect of creating satisfactory transitions that is outweighed by the necessity to recognize the compatibility of musical styles and to build a “vocabulary” of creative ways to combine tracks, which has been broadened by a variety of software functions such as looping. However, I discovered that learning to beatmatch with vinyl is a beneficial exercise for any DJ because it helps develop aural skills and an understanding of rhythms and musical textures.

Finally, I examined the performance situation itself, which is constituted by the interplay between the DJ himself, the technology he uses, the music he plays and the crowd on the dancefloor. Applying the concept of “presence”, I described the effect of the different technologies based on their physical appearance and the symbolic meanings they are charged with. In this context, the turntable not only fascinates people due to its size and peculiar configuration, but also through the historic significance it bears as the DJ’s traditional tool. Conversely, controllers are imbued with a certain playful aesthetic and still developing an identity, even though in large sizes, they possess an ecstasy at least similar to the turntable’s. Digital vinyl emulation systems disguise their “controllerism” by adopting the turntable’s ecstasy. The DJ’s presence is composed of his somatic behavior and musical programming. The former refers to the “infectious” enthusiasm and responsiveness to the crowd, which can be curbed by interaction with the technologies in different ways, but ultimately depends on the DJ’s personality and volition. The latter skill is at the heart of the art of DJing. Through a constant feedback loop with the audience, the DJ creates a dramaturgy to guide the crowd’s mood, which not only shapes his musical identity, but is also the driving force of dance music subcultures, which are constantly negotiated collectively by DJs – the tastemakers – and their responding audiences.

The DJ’s most powerful tool is the music itself, and his most fundamental skill is, and always will be, playing the right song at the right time. I want to make it clear that no technology can ever replace this skill. A transition may be a complete train wreck, an MP3 may be in bad quality, the DJ may pull a face as if his grandmother has just died. I have witnessed all of these mistakes, and even committed them myself. In the end, if it is the right song, people *will dance*. The same applies vice versa: Perfect technique and charisma will not make the crowd dance if the wrong song is playing. Programming is the skill that will always secure the element of human agency within the craft of DJing, unperturbed by the comings and goings of technologies. The only way the art of DJing could disappear is if DJs stop making good programming, because “it’s a very lonely experience, playing records that no one wants to dance to.”[[117]](#footnote-117) The audience is the performance – therefore, if there is no audience, there is no performance and no need for the DJ.

einfluss der technologien!!!

egal ob digital oder analog

indirekt

zitat von DJ

1. Lastnight 22 [↑](#footnote-ref-1)
2. It indicates the tempo of a song (Beats Per Minute). [↑](#footnote-ref-2)
3. culturemix 37 [↑](#footnote-ref-3)
4. culturemix 37 [↑](#footnote-ref-4)
5. Perfectingsound 53 [↑](#footnote-ref-5)
6. Culturemix 37 [↑](#footnote-ref-6)
7. Perfectingsound 191-192 [↑](#footnote-ref-7)
8. Katzi 220-221 [↑](#footnote-ref-8)
9. http://www.soundonsound.com/sos/1995\_articles/aug95/midibasics1.html [↑](#footnote-ref-9)
10. http://www.midi.org/aboutmidi/tut\_techomidi.php [↑](#footnote-ref-10)
11. http://www.scratch.com/what-is-midi-and-how-do-djs-use-it/ [↑](#footnote-ref-11)
12. Schechner 154 [↑](#footnote-ref-12)
13. Erika 24-29 [↑](#footnote-ref-13)
14. Erika 29-31 [↑](#footnote-ref-14)
15. Ulf 17 [↑](#footnote-ref-15)
16. Erika 31 [↑](#footnote-ref-16)
17. Spielfiguren 105f [↑](#footnote-ref-17)
18. Spielfiguren 85 [↑](#footnote-ref-18)
19. Lastnight 13 [↑](#footnote-ref-19)
20. Lastnight 12-15 [↑](#footnote-ref-20)
21. Schechner 141 [↑](#footnote-ref-21)
22. Schechner 119 [↑](#footnote-ref-22)
23. Spielfiguren 69, 80, 93, Erika 98-99 [↑](#footnote-ref-23)
24. Schechner 37, 169, spielfiguren 93 [↑](#footnote-ref-24)
25. Erika 32 [↑](#footnote-ref-25)
26. Erika 36 [↑](#footnote-ref-26)
27. Spielfiguren 97 [↑](#footnote-ref-27)
28. Lastnight 13 [↑](#footnote-ref-28)
29. Lastnight 12-15 [↑](#footnote-ref-29)
30. Milner 2010, 4 [↑](#footnote-ref-30)
31. Brewster and Broughton 2006, 28-29 [↑](#footnote-ref-31)
32. Brewster and Broughton 2006, 30 [↑](#footnote-ref-32)
33. Lastnight 36, ulf 41 [↑](#footnote-ref-33)
34. Lastnight 44-46 [↑](#footnote-ref-34)
35. Lastnight 56-58 [↑](#footnote-ref-35)
36. Perfectingsound 5-7, 118-119 [↑](#footnote-ref-36)
37. Perfectingsound 47 [↑](#footnote-ref-37)
38. Brewster and Broughton 2006, 52-56 [↑](#footnote-ref-38)
39. Lastnight 58-59 [↑](#footnote-ref-39)
40. Lastnight 61-65 [↑](#footnote-ref-40)
41. Lastnight 87 [↑](#footnote-ref-41)
42. Brewster and Broughton 2006, 130 [↑](#footnote-ref-42)
43. Brewster and Broughton 2006, 83 [↑](#footnote-ref-43)
44. Katz 2012, 24 [↑](#footnote-ref-44)
45. Kohl 114 [↑](#footnote-ref-45)
46. The turntables: Vestax PDX-2300 and FDX-2300 MkII Pro, the mixer is a (???) [↑](#footnote-ref-46)
47. Htdjr 22 [↑](#footnote-ref-47)
48. Spielfiguren 151 [↑](#footnote-ref-48)
49. Lastnight 15 [↑](#footnote-ref-49)
50. Culturemix 125 [↑](#footnote-ref-50)
51. Culturemix 130-131 [↑](#footnote-ref-51)
52. Katz 2012, 11 [↑](#footnote-ref-52)
53. Lastnight 88 [↑](#footnote-ref-53)
54. Prof groove [↑](#footnote-ref-54)
55. Ironically, they have had to deal with a heavy backlash from outsiders accusing them of disrespecting the records they are scratching or sampling, whereas they perceive it as salvaging whatever they can from a “pile of broken dreams” (DJ Shadow, *Scratch*) [↑](#footnote-ref-55)
56. Katzi 46 [↑](#footnote-ref-56)
57. The recommended sample rate for MP3s. [↑](#footnote-ref-57)
58. scratch [↑](#footnote-ref-58)
59. Professor Groove is a well-known funk DJ based in Montreal, Canada, who has been hosting the internationally popular radio show Wefunkradio on CKUT 90.3 FM with his partner DJ Static for roughly 15 years, even touring through Europe every one or two years. Additionally, he plays regularly at a dance bar in Montreal, and occasionally other club gigs. These days, he uses Serato, but he has also used CDs a lot. [↑](#footnote-ref-59)
60. Montano 2010, 400 [↑](#footnote-ref-60)
61. Erika 27 [↑](#footnote-ref-61)
62. Slightly altered version of Eleanor Roosevelt quote http://thinkexist.com/quotation/freedom\_makes\_a\_huge\_requirement\_of\_every\_human/343940.html [↑](#footnote-ref-62)
63. scratch [↑](#footnote-ref-63)
64. Dr. Best [↑](#footnote-ref-64)
65. Ruby Jane [↑](#footnote-ref-65)
66. Ruby Jane [↑](#footnote-ref-66)
67. For detailed instructions on how to mix with vinyl, see Brewster and Broughton 50-75 [↑](#footnote-ref-67)
68. Htdjr 52 [↑](#footnote-ref-68)
69. Culturemix 21-25 [↑](#footnote-ref-69)
70. Culturemix 29 [↑](#footnote-ref-70)
71. Culturemix 40 [↑](#footnote-ref-71)
72. Culturemix 30 [↑](#footnote-ref-72)
73. Htdjr 128 [↑](#footnote-ref-73)
74. Htdjr 63-91 [↑](#footnote-ref-74)
75. scratch [↑](#footnote-ref-75)
76. Culturemix 29 [↑](#footnote-ref-76)
77. Katzi 218 [↑](#footnote-ref-77)
78. Katzi 217 [↑](#footnote-ref-78)
79. Katzi 220 [↑](#footnote-ref-79)
80. Katzi 223-225 [↑](#footnote-ref-80)
81. Tracking 40 [↑](#footnote-ref-81)
82. Pacman 413 [↑](#footnote-ref-82)
83. Mix 41 [↑](#footnote-ref-83)
84. Pacman 408-411 [↑](#footnote-ref-84)
85. Tracking [↑](#footnote-ref-85)
86. Erika 93-94 [↑](#footnote-ref-86)
87. Erika 116 [↑](#footnote-ref-87)
88. Find source? Or not necessary? [↑](#footnote-ref-88)
89. Pacman 399 [↑](#footnote-ref-89)
90. Pacman 406 [↑](#footnote-ref-90)
91. Katzi 237-240 [↑](#footnote-ref-91)
92. Mix 27 [↑](#footnote-ref-92)
93. Spielfiguren 168 [↑](#footnote-ref-93)
94. Professor Groove [↑](#footnote-ref-94)
95. vibration 168-169 [↑](#footnote-ref-95)
96. Erika 98 [↑](#footnote-ref-96)
97. Professor Groove [↑](#footnote-ref-97)
98. Katzi 226 [↑](#footnote-ref-98)
99. Katzi 226 [↑](#footnote-ref-99)
100. Katz 227 [↑](#footnote-ref-100)
101. Pacman 413 [↑](#footnote-ref-101)
102. Schechner 42 [↑](#footnote-ref-102)
103. Professor groove [↑](#footnote-ref-103)
104. Erika 119 [↑](#footnote-ref-104)
105. Pacman 405 [↑](#footnote-ref-105)
106. Katz 228 [↑](#footnote-ref-106)
107. Erika 36 [↑](#footnote-ref-107)
108. Htdjr 124, 134 [↑](#footnote-ref-108)
109. Htdjr 112, [↑](#footnote-ref-109)
110. Htdjr 129 [↑](#footnote-ref-110)
111. Pacman 402 [↑](#footnote-ref-111)
112. Klein 180 [↑](#footnote-ref-112)
113. Erika 174 [↑](#footnote-ref-113)
114. Erika 148 [↑](#footnote-ref-114)
115. Htdjr 112 [↑](#footnote-ref-115)
116. Ulf 32 [↑](#footnote-ref-116)
117. Htdjr [↑](#footnote-ref-117)