Digging in the Crates: An Ethnographic Study of DJs' Work

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ABSTRACT

An ethnographic study uncovers the work of nightclub DJs, which extends far beyond the act of mixing tracks to also encompass collecting music, preparing for performances, and promotion and networking. We reveal how DJs value vinyl and digital formats in different ways, acquire music through 'crate digging', prepare physical and digital crates of music before gigs, and how these underpin improvised selections during their performances. We document how DJs interact with promoters, venues, dancers and other DJs, revealing an etiquette that governs how they select and share music, and manage an ongoing tension between revealing and hiding metadata so as to maintain a competitive edge. We raise implications for technologies to support DJs, while also shedding light on previous studies of music consumption and sharing in other settings.

Author Keywords

Ethnography; DJs; music; sharing; metadata; performance

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J.4 [Computer Applications]: Social and Behavioural Sciences – Sociology;

General Terms

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INTRODUCTION

While the origins of DJing as a musical form can be traced as far back as the 'sock hops' of the 1950s, the contemporary DJ is most likely to be found in a crowded nightclub, using turntables and mixers to provide a continuous stream of music for a frenzied crowd. The traditional craft of the DJ lies in the skillful manipulation of vinyl records on turntable platters and especially in 'beat matching' – i.e., the smooth mixing of one track into the next [4]. However, modern DJs are increasingly turning to digital music, using specialised software to manipulate digital music files on laptop computers. Vinyl emulation systems such as *Traktor* and *Serato Scratch Live* strive for the best of both worlds by allowing DJs to use specially marked vinyl controllers to manipulate digital music files.

Contemporary DJing provides a salient site to explore the interplay between traditional physical and emerging digital forms of music and so inform future music technologies. It should therefore come as no surprise that there is already an established history of DJ-related research. A previous study of DJs performing in nightclubs revealed how they draw on various cues to adapt their performances to the dancers [11]. Other studies have explored DJs' varying attitudes towards new digital technologies [10] and the changing notions of DJ practice that have arisen as a result [15]. Novel technologies have been developed to partially or even fully automate DJing such as *Mixxx,* which employs automatic beat matching so as to free up the DJ's time to engage with other creative elements of performance [1], and *HpDJ* that more fully automates DJing, from beat-matching through to the selection of records and audience feedback [8]. Other systems aim to enhance the DJ's performance through the use of multi-touch surfaces [14], wireless or mobile controllers [6, 18], or by adding haptic feedback to analogue turntables [2], also reflecting various strategies for enhancing the expressive interactions of VJs (video jockeys) [12]. A quite different approach is to sense the movements of dancers in a nightclub and use this to drive the music directly [13, 20]. We return to this body of work later on, suffice to note here that up to now the overwhelming focus of these various studies and prototypes has been on the moment of *live performance* within the nightclub setting.

While undoubtedly a critical part of what DJs do, this moment of performance is far from being the *whole story*. In this paper, we present an ethnographic study of the work of DJs that takes a more holistic view of their craft. By observing and interviewing DJs in their homes and studios, as well as at gigs, we document the complexities of how they collect music, prepare for bookings and perform. Our study elaborates 'the work to make the performance work'; that is the range of socially organised activities that underpin live performance and provide for its accomplishment. We show how the organisation of a DJs' work is constituted in and through the sequential ordering of varied music-making activities that they must undertake to deliver a live performance. This is not to say that each activity in the sequence is 'busied' with the making of music, but rather that the making of music relies on them. We also document how these various activities are organised socially with regard to other DJs, promoters and clubbers, including the etiquette of how DJs share music.

Our findings raise implications for a variety of music-related technologies, from those that directly support musical performance to those that support music sharing, while also speaking to more general studies of the social sharing of music away from the DJ's booth [3, 5, 17, 21].

STUDYING DJS' WORK

Adopting an ethnomethodological approach that focused the ordinary day-to-day work-practices of DJs, we visited DJs at the various places they do their work so that we could observe the naturally accountable ways in which they conduct and organise it. We carried out observations in their homes and studios, witnessing how they prepared for performances, taking photographs and video recordings, and talking with them about their work-practices and the practical reasoning involved in doing them. We then accompanied them to performances in nightclubs where further observations, photos and videos were captured. Follow-up interviews provided clarifications and further elaborations of the work we had witnessed. Throughout, our focus has been on the 'job' of being a DJ, and of a particular kind of DJ at that. While the term DJ potentially refers to a wide range of people such as radio DJs or wedding and function DJs, our study focuses on DJs in the world of electronic dance music who are engaged with the artistic and creative elements of mixing and DJing for nightclubs. All of the DJs in our study could be referred to as experienced 'DJ/Producers' who are actively involved in making dance music as well as performing regularly to audiences in clubs.

We accompanied three DJs to three different events that were staged in the same city in the UK. 'Detonate' is a long-standing urban music event which started as a Drum and Bass and Hip-Hop night in 1999 and has since grown to encompass many more styles of electronic dance music such as Dubstep, Breakbeat and UK Garage, attracting top national and international DJs along the way. 'Wigflex', another electronic dance music event run by a record label of the same name, also encompasses varied musical styles and is known for its experimental and forward-thinking music. 'Give Them' is a smaller UK Garage event with a more student-oriented focus. The Wigflex and Detonate events took place in the same nightclub, while Give Them took place at another somewhat smaller venue. We also accompanied one of our DJs on overseas performances in two European cities.

ELABORATING THE WORK OF A DJ

Below we present key excerpts from our studies that illustrate the work of our DJs in preparing for and delivering the live performances we witnessed, ranging from how they build their music collections through to how they select and mix tracks during live performances.

Building a Collection

A DJ's personal record collection provides the raw materials with which they work and underpins every other aspect of their craft. Unsurprisingly then, building a personal music collection is a significant ongoing activity for a DJ. Building up a collection involves four key work-practices: buying new releases, crate digging, gift-giving, and making beats. We briefly elaborate each in turn.

Buying new releases

Our participants purchased music in two key formats – vinyl records and digital downloads; the purchase of CDs was rare. They had a preference for vinyl records due to the tactile nature of the format and the perceived superior sound quality of analogue recordings, despite vinyl being more expensive than digital downloads and the latter being easier to get hold of. Buying vinyl means buying an entire recording, even if only part of it is required at the moment of purchase. This wasn't seen as a particular problem however, but as something that often occasioned the discovery of new tracks.

"With vinyl there are records that I bought for one side, but now play the other side more … Having both is quite cool because you might play the same record in different parts of the set and in different contexts."

Digital downloads, by way of contrast, allow single tracks to be purchased. While this pick 'n' mix approach may make buying music cheaper and more convenient, it also results in 'narrower' digital collections. This makes (re)discovering music from within one's own collection far less likely, thus reducing the scope for creativity.

"With MP3s, you basically just buy the ones that you want, so it kind of kills the idea of an EP [Extended Play], because you don't have to buy the whole EP, so it's not a real collection as such."

Regardless of the medium, our participants purchased the vast majority of their music through specialised online stores such as juno.co.uk, boomkat.com and chemical-records.co.uk, which provide resources that are attractive to DJs, including relevant metadata that helps them select tunes with a view to how they can be mixed with others. Two important attributes of this metadata are the key and tempo of the tracks. Tempo is essential to predicting whether a new track can be mixed with existing ones in the collection, and key is important in determining whether two tracks will mix together harmoniously.

"Some websites tell you the key and tempo as well, which maybe means you end up making false decisions about stuff, but also means if you have two house tunes in one key that are both vocal, and you need a dub to mix between them, you can find a dub that's in the same key and then you'll know it's gonna work. Whereas otherwise you'd have to get it out, play it, try mixing it with different stuff and make sure it's in the right key."

Crate Digging

For many DJs, purchasing music is not only about finding new releases; it also involves unearthing *old ones*. 'Crate digging', or seeking out old recordings, is a key part of the sampling culture that originated within the hip-hop and electronic dance music scenes of the late 1970s and early '80s. This is very much an exploratory practice, as the value of a record can lie in anything from a particular vocal sample or a small section of a melody, to a specific drum break or sound. Crate digging thus involves searching

through genres and styles of music which may be vastly different from the DJ's own.

It is also a practice that is strongly associated with the vinyl rather than the digital format, as many old and obscure records are simply not available to download. The DJs in our study routinely 'dug around' car boot sales, charity stores and bargain basements. As it is usually not possible to listen to these records before purchasing, visual information and metadata provide especially important filters for 'digging' through record collections and separating the 'good' from the 'bad'. As with buying new releases, DJs rely on some distinctive metadata here:

"If you find anything that has certain drummers on it, there's gonna be good breaks on it. If there's anything on certain labels from a certain era there's gonna be good things on it. Anything that has a picture of someone in a spaceship on it is probably gonna be good, unless it's from the '80s … "

For dance music DJs in particular, crate digging provides a further source of music to utilise in their mixes, re-contextualising old or forgotten dance records that may find new purpose or meaning within the context of a contemporary performance.

"You can often make people think that an old tune is a new tune if you play it in the right context. Stuff that wasn't relevant becomes relevant later on."

Some of our DJs engaged in online crate digging, using online marketplaces such as eBay and discogs.com to dig out old recordings. However, rare or in demand records are often expensive and finding a bargain is an important part of crate digging:

"A lot of the old garage I've got I bought for 20p in the basement of Anarchy. Because I know the record labels and stuff, without hearing them I've bought them. Some of it I've just thrown away but the good tunes I've kept."

An element of secrecy appears to be important here, as DJs can spend a lot of time and effort crate digging, and may fear that disclosing the names of these records will allow others to bypass this process.

"Sometimes when you've found stuff you don't want other people to get hold of it. Old tunes, especially…There is that crate digging element of getting songs that are exclusive to you because everyone else has forgotten about them, not because they're new…People can get hold of them if they want to, but they're not gonna find them without looking."

Gift-giving

As DJs develop a reputation, an increasing proportion of their music is acquired from others who wish to gain exposure for their own recordings. Record labels, recording artists and other DJs routinely gift music, sometimes to the extent that it can almost remove the need to purchase new records. Gifting is not the same as sharing, however:

"DJs don't really share records. They'll give each other their own records, but it's not really a good thing to go up to someone and be like 'Oh, can I borrow that record?' You just don't do it. You buy your own."

The target market for the sale of dance records is predominantly other DJs. This means that there is an inherent tension between the need to promote a record and the desire to avoid 'leaking' copies, which may affect future record sales. Gift-giving is, then, quite selective:

"Loads of people are obviously guys who are just home DJs. Of course, I'm not gonna give them the music. Other people - saying 'here's a link to a podcast of my radio show I did last week on blah blah FM' - I'll give them the tunes because I know they're gonna promote it."

Often this means that more high-profile DJs who have a strong presence in nightclubs and on radio stations are on the receiving end of 'promos', but online forums and social networks are also effective promotional platforms and DJs who are active in these online spaces attract attention:

"I started a thread about a particular genre of music and posted a mix of that kind of stuff and posted it all over twitter and stuff, and then I suddenly had loads of guys from that kind of genre who I didn't have tunes from sending me loads of tunes because they were like 'oh, this guy's playing loads of this stuff and getting it out there, maybe he can do that for me'."

It is not uncommon for DJs to offer their own recordings in the hope that this will encourage others to send them theirs, resulting in a kind of online trading of music, with new or exclusive records as the currency.

"It's almost like a currency. Sometimes I'll send a zip of my tunes and they feel maybe obliged to send me theirs. The big DJs who don't produce but have record labels use them as currency."

Finally, from the point of view of the DJs, having promos that other don't have attracts audiences and helps convince others that they are 'worthy' of receiving promos.

"There's no one from my side of the scene who has that tune, which gives me a bit of exclusivity."

Building a collection is as much a matter of building relationships, then, as it is of buying music, and digital forums are becoming increasingly central to this.

Making Beats

All of the participants in our study also 'make beats', or produce their own music for live performance. This is common practice within dance music, and as such many artists refer to themselves as 'DJ/Producers'. While not all dance music DJs are involved in production, and not all producers are DJs, the two practices are often intertwined. DJing can act as the performance counterpart to music production, where producers present their music to audiences by incorporating their records into live sets.

The relationship between the records that DJs produce and the records that DJs acquire can often depend on whether they view themselves primarily as a DJ or primarily as a producer. The majority of DJs in our study began life as DJs before branching out into production, and as such the style of music they produce bears a strong resemblance to the styles of music in their record collections.

"I make my own music to play in my own sets. I'm not gonna make a hip-hop tune because I can't play it out, and I'm not gonna make a drum and bass tempo tune because I don't have any other tunes to mix with it."

"If you took one song that I've made, you could probably find all the elements of that song in all of these records in my bag, but maybe in different orders or different combinations … I'm designing songs to present in a set that I think would work in the way that I mix."

For many aspiring DJs, producing music provides an opportunity to transition from the more functional role of keeping people dancing to becoming recognised as a legitimate artist, and it is this recognition of artistry that can propel a DJ from the role of a 'warm-up' or support DJ to becoming a headline act, and ultimately commanding much larger booking fees.

"Over the years, I want to play a lot of my stuff, so that I start becoming the artist rather than just, um, sort of resident or warm-up or warm-down DJ, or whatever you want to call it."

Dance music production is (obviously) dance-floor orientated, being about getting people up on their feet and keeping them engaged. Less obviously perhaps, the nightclub setting itself is seen and treated as an ideal *test bed* as well as promotional platform for producers.

"There's a few things I want to get from a set. Trying out new tracks, tracks that haven't been mastered, giving them a test, seeing how they work, and then, also, fitting them into a set that people are still gonna dance to."

So in addition to drawing on a record collection to design sets of music, which turns upon the DJ's art of 'mixing' by ordering tunes, creating intros, drops, breakdowns, as we shall discuss below, there is also a strong sense in which the production of music is an *iterative business:* a job of work that takes place online and off as it were, shaped as much by what goes on on the dance floor and the music's reception as by what goes on elsewhere. This feedback loop constitutes a key part of the DJ's art and mastery of it propels a DJ's career, from resident DJ and warm up act to a lead role on the broader social stage.

Getting Bookings

The process by which DJs gain recognition and receive the bookings that are essential to their careers is a complex one. Since dance music DJs perform mainly in nightclubs, the vast majority of bookings come from venue and event promoters. Getting bookings turns upon effective self-promotion, record releases, successful radio shows, etc. As with other live music events, multiple acts are usually booked to perform at a venue. These are often separated into headline acts, around which the event is promoted, and support acts that make up the remainder of the bill. The number of headline and support acts on any one bill depends on the scale of the event and the budget of the promoters. Headline DJs will usually perform about half-way through the event, with support acts providing warm-up and warm-down performances. These support acts are often resident DJs who work at the venue on a regular basis, and at some of the events observed in this study these included the promoters themselves.

Promoters essentially perform a curatorial role, selecting what they deem to be an appropriate combination of live acts for their events. Their main aim is to provide a programme that will keep the dancing crowd engaged.

"The promoter's role is to pick a combination of DJs that will make people wanna dance. That's basically what it's about – it's dance music at the end of the day."

The style of a particular event is an important factor shaping a promoter's selection of DJs and, in turn, a DJ's selection of music for an event. Our discussions with DJs revealed a nationwide network of promoters and DJs, with the latter being categorised on the basis of their status and the style of music they play. Successful radio DJs and music producers have little problem getting bookings, and will often have agents or representatives working for them. For the many DJs below this level, attracting attention from promoters can be a difficult process, however.

At this level, with many DJs competing for limited numbers of bookings, knowing what events are taking place and who else is trying to get these bookings becomes very important. *Maintaining awareness* of other DJs and what they are playing can help DJs distinguish themselves from others in their field, and with countless DJs and nightclubs up and down the country this is not always easy to achieve.

"There are certain DJs that'll play your sort of stuff, and that's how promotion works – there's like a pool of names that'll be playing one type of thing, and they are sort of dispersed around different parts of the country on the same night. So you've really gotta be aware of where other people are playing - listening to radio shows and things a lot and staying tapped into it all. You've really gotta think about it a bit more, if you're gonna play similar stuff to them. I think better DJs try and do their own thing a bit more."

The Internet has become a vital tool for DJs, both in their pursuit of bookings and in maintaining awareness of the wider music scene. All of the DJs in our study had several online outlets for their music. These include online radio shows, podcasts, and profiles on social music platforms such as MySpace, SoundCloud and MixCloud. Having a strong online presence has become a vital means of attracting attention from promoters. 'Studio mixes' are live recordings of DJ sets mixed at home or in the studio, and posting these online has become an important part of this self-promotion. For the DJ trying to get bookings this can serve as the online equivalent of the demo CD, but with so many different online outlets for these mixes DJs must attempt to promote on several if not all fronts. The aim is to garner as much interest as possible, and one effective method for this is to provoke discussion in online spaces such as radio show chat rooms and forums.

"Soundcloud, Mixcloud, Facebook, Twitter, the forums … the forums are good because they're there forever and people can talk about them a bit more and ask you questions about it, you know, like 'what's this tune?', and that's extra promotion"

However, while DJs are clearly making extensive use of these online spaces for promotion, without the direct feedback that live performances provide it can often be difficult for them to gauge people's reactions to their work.

"It's kind of difficult. On sub.FM you've got the chat room, but the chat room will tell you when they like something but not when they *don't* like something."

So while digital solutions are key to promotion and securing bookings, there is a strong sense in which they do not, as yet, augment the feedback loop that is essential to the DJ's art: it's not only a case of knowing what works but of knowing what doesn't as well.

Planning the Set

When a DJ gets a booking he or she must then decide on which records to play in a set and what order to play them in. DJs have to *plan* their sets and while there is, of course, a degree of contingency that must be handled in the course of live performance and realising the plan [19], DJs still need to work out what they are going to play in advance. This turns upon 'putting crates together' – i.e., a collection of musical material to be taken to the venue. Historically, DJs used milk crates to store and transport their records to and from gigs. Today, the term 'crate' has come to refer to a sub-collection of the DJ's larger music archive, which is compiled for a particular performance. Crates include both physical and digital recordings, and the term is used in emulation software such as Serato to refer to the playlists or folders of tracks created by the user.

Crates are assembled for each music format (physical and digital) and may be assembled weeks before an event or hours before it. Vinyl records are stored in dedicated record bags. It is common for DJs to populate and arrange record bags in the order they intend to play the records they contain, though the order may be changed and tweaked during the performance. DJs using digital music usually bring their own laptop and hard drive to performances. In principle, this gives access to potentially vast, searchable music collections during their performance. In practice, however, selecting from large collections during a performance can be overwhelming, and so MP3 crates assembled in folders are created instead.

Digital crates are not strictly the same as playlists. They allow DJs to create a manageable sub-collection of MP3s and are of a similar content size to vinyl crates.

"What I do is I make - not a playlist as such, although I do sometimes put tracks in the order that I know I wanna play - but I make a crate of the tunes I wanna play out. Usually I would have something like 30 tracks loaded in the crate and I wouldn't deviate from that – in the same way you'd have a record bag and you pick your tunes before you go out and organise them and stuff."

Figure 1. Preparing a physical crate.

Deciding which records to include in a crate is based on a number of musical and performance considerations. Musically, for example, the key, rhythmic style, genre, and tempo of beats all matter, but from a performance point of view planning also involves consideration of such things as the 'feel' or 'energy' of a track. Many of the DJs in our

study cited bass as an important criterion for music selection, but this can vary depending on the style of the music and the stylistic choices of a particular DJ.

"It's about energy. Synths can be high-energy, but the bass line can be too. The bass line's really important."

"I don't know how to categorise the music I play. Its just dance music. A particular type of dance music at a certain tempo. Other than that, it's bassy. Bass is a big drive."

This can provide a starting point around which to construct the performance, keeping the core structure of the set grounded in the stylistic choices of the DJ and the overall 'sound' they wish to present to their audiences. Deciding on what order to play the selected records is generally considered in terms of tempo or BPM (Beats Per Minute). In order for two tracks to be placed adjacent in a set, their tempos must be sufficiently similar so that they can be 'mixed' effectively.

"Its sort of trying to merge and sort of bring it all together under the idea of BPM, and you always give about 5/6 BPM each way. You're always thinking of BPM when you're choosing music. It tends to be BPMs and then the musical content."

The 'energy' of a track, although difficult to characterise, is an important consideration when selecting both what material to play and in what order to play it. DJs are concerned to vary the energy of the music during a performance, using it to pace and 'switch up' a set.

"When you're switching up a set, like sometimes when I'm choosing a track, if I know I want to play a banger in like five minutes, I'll maybe play something that's a bit less upfront, so maybe a more interesting thing and then slow it down, and then bring in a banger."

As with any live event, there is always the possibility that things may not go to plan. Needles may skip, mixers or turntables may be faulty, laptops may crash, and so on. DJs attempt to prepare for contingencies while putting their crates together by making sure they have 'back-up' music available to play.

"There's like 4 kind of garage-y tunes that are all at the same tempo which I almost always play at the same length, and usually they'll sit in the crate next to each other. So I'll have that as a section I have planned, sort of thing [...] the good thing is you can have them there in a crate, and you can look at them and think 'I can do that'. Because sometimes things go wrong and you just need a bunch of tunes that you know you can mix."

Having crates in multiple formats helps to alleviate concerns about faulty equipment. For example, if a laptop crashes during a performance then having vinyl records at hand means that they can still play music. Since the main aim of the performance is to keep people dancing, DJs try to keep the music going at all costs.

Preparing at the venue

Having planned a set, a DJ cannot just turn up at a venue and launch into it; further work prefaces performance. DJs are not lone operators. Their work is intimately connected to that of others, particularly promoters and nightclub staff when they actually arrive on site. Preparations also involve setting up technical equipment.

Nightclub Staff and Promoters

DJs encounter various nightclub staff during the setting-up process and throughout the course of the performance. Engineers assist with plugging in performance equipment, adjusting audio levels and resolving any technical problems and bugs. Bar staff may be called upon to provide drinks for the DJs in the booth. Promoters and nightclub management may also visit the DJ booth to greet the DJs, make sure they have everything they need, or simply to watch and listen to the performance. These encounters play a bigger part during nomadic performances, where everything from the nightclub's location to the language may be unfamiliar. Promoters can often play an important role here, ensuring the visiting DJ's needs are met. Of course, some promoters are better at this than others, and on the two occasions where we accompanied DJs to overseas nomadic performances we observed a remarkable difference between the promoters in terms of the support they offered the visiting DJ. In one case, everything from transport and accommodation to food and drinks was provided and the promoter was in constant contact with the DJ. In the second city, this support was nothing more than a phone call detailing the name of the club and the opening time.

Of all of these interactions with staff, the most critical to the DJ's performance are those with the venue's engineer. Since the DJ only has access to the mixer and turntables, any audio level adjustment and sound checking must be done in collaboration with the engineer, who has control over the main mixing desk and therefore the master volume and audio levels. In all of the venues we visited, the mixing desk and lighting controls were located within sight of the DJ booth in order to facilitate communication between the engineer and the DJ.

Getting Equipment Ready

Once the DJ is in the booth, he or she must unpack their equipment and integrate it with that installed permanently in the nightclub. Typically, the equipment already present at a nightclub's DJ booth will include two analogue turntables, two digital CD turntables, a mixer, and two monitor speakers. Some DJ booths also provide docks for laptops, hardware and cables to connect laptops to turntables, and storage space for records and personal belongings. The kinds of equipment DJs bring to a performance varies, and can include additional performance tools such as hardware controllers, but the bare minimum DJs are expected to provide is headphones and music. Vinyl crates are arranged within the DJ booth for ease of access during performance. Digital crates are loaded into DJ software (if not already loaded) and displayed on the laptop screen. Physical records may be removed from the record bag and placed on a shelf or in another more convenient location. CDs, if used, are loaded into CD turntables and wallets are placed in a convenient location for access during performance. This process of getting equipment and resources ready is often the last opportunity for DJs to prepare for any problems that may occur during the performance.

Playing the Set

With the exception of the first DJ to perform at an event, DJs do not normally have the opportunity to do a sound check before performing as might a live band, as this would create an unacceptable break in the music. This is not to say that sound checks don't take place. DJs still need to adjust levels and volumes in the same way as live bands and may be using unfamiliar equipment that requires adjustment and customisation. Rather, the first few records played serve as much as a sound check as the opening of a performance.

The selection of tracks during the performance is much more fluid than the assembled crates suggest, and is driven to some large extent by the DJ's interactions with the crowd. Indirect communications such as cheering, clapping and whistling are all common ways of complimenting and congratulating the DJ, for example, and it is also common to see dancers raise one or two hands in the air if they are particularly enjoying the music. More experienced DJs are aware of subtle behaviors in the crowd, however, noticing and responding to when people get tired, or thirsty, or wander off for a cigarette. While DJs are aware they cannot cater for all of these people simultaneously, they actively respond to 'high and low-volume' points in a performance and try to maintain a core presence on the dance floor.

"People float around getting a feel for the night - float in and out for the first hour, half-hour. So I'll start by playing my slower tunes that aren't as full-on, or maybe not as catchy, that will retain people."

The timing of a set is important. It is not uncommon for clubbers to consume alcohol and other drugs, meaning that their perception of and reception to the music and a DJ's performance can change as the night goes on.

"The impact of the music is important. Yeah, and drugs are a big part of that as well. There'll be a certain time of the night I want to save tunes for because I know people will be on a certain level and the crowd will be on a certain level. So if I'm playing 11.30-1 or 11-1, I'll save my heavier tracks for later and play ones that maybe I can have a bit of a groove with in the first hour, whereas if I'm playing at 3am or something, I'll plan a much tougher set, definitely."

The ways in which the crowd is worked depends on the slot that a DJ has in the overall programme:

"You do have a bit of a role of warming the crowd up, and trying to get them prepared for the DJ that's on next, so I'm not gonna play all the biggest tunes, not gonna play tunes by the DJ that's on next, not gonna play some of the big tunes that those DJs might be representing … You don't want to go and play all the heavy big tunes so when they come on people have already gone for it quite hard, or you've reached a climax before the person's even gone on. That tends not to be a good idea."

Direct communication between DJ and audience does occur, with dancers attempting to speak to the DJ during a performance. Occasionally this consists of making requests to play certain tracks, though these are seldom fulfilled. More often it is to express approval or to ask the name of a certain record. Crowd members also peer over the booth in an attempt to identify the name of tracks without interrupting the DJ and in doing so often rub against their craft sensibilities. DJs can often be what at first glance

appears as surprisingly reluctant to divulge their sources and the names of the tracks they play.

"There's an element of secrecy here, which is what they used to do in the old days as well. All the hip-hop guys and stuff, when hip-hop was quite big, like Afrika Bambaata and stuff, used to put white stickers all over the centre of their records so no-one could come up and read them."

This practice extends to digital formats as well, where DJs alter the metadata of their tracks on their laptops so as to display ambiguous titles.

"He basically didn't like the names of his tracks coming up in Serato, so he'd named them all in BPM. He was playing loads of his own dubs and refixes, and he puts a lot of time into it."

There are several reasons why DJs attempt to hide the names of records from audiences. Sometimes it is to preserve exclusivity around unreleased records. It can also be a way of attracting audiences in the first place, as people must come to hear a DJ in order to hear particular tracks.

"You've got this tune, other people don't have it, so people have to listen to you."

Secrecy plays a professional role, then, being part and parcel of the DJ's art, and it is central to building a reputation and career. This is a fine line to tread, however, between keeping information secret and revealing it.

"I was feeling a particular kind of sound that day and I thought I'm gonna do a mix of this stuff, and I'm gonna mix it in with some stuff that people might already like and might already know. For that I gave a track list because what I'm trying to say is 'I've got these tunes, what do you think of them?' It's an educational thing."

Whatever the case, hide or reveal, it is part of working the crowd and that turns upon a DJs ability to respond to what the audience is doing and to gear the music into a lively set of interactions taking place on and around the dance floor.

Ending the Set

At the end of a DJ's set, it is time to either hand over to the next DJ and pack up the equipment, or, if it is the last DJ performance of the event, to stop the music and pack up. Handing over to the next DJ is often done seamlessly, with the next DJ mixing his first track with the previous DJ's last track. Sometimes, however, the next DJ may want to go in a different musical direction or let the crowd know their performance is starting, and so may let the last DJ's record play to the end, or stop it and then play the first record from the beginning. The handover of control from one DJ to the next is often demarcated by the removal of the previous DJ's headphones from the jack and the plugging in of the next DJ's headphones.

It is commonplace for DJs to remain in the booth and surrounding area after their performance has ended. They may just have a drink and watch the next DJ perform, though as often as not the DJ's work is not done. There's the business of listening to the competition 'here and now' and seeing what (if anything) one might take from that. There are promoters to talk to and future possibilities to explore. There's the crowd itself and conversations to be had with members about what's going on elsewhere. The DJ is *not* an isolated operator. The job relies on the ability

to make and mix music, but a significant part of it also relies on social networking. So while the performance is over for the time being there are people to meet and greet and the wheel turns.

IMPLICATIONS AND DISCUSSION

We are able to draw out two general kinds of implication from our study. First, by comparing our holistic view of the work of being a DJ against previous HCI research related to DJing, we are able to identify some relatively unexplored, and hence potentially fruitful, avenues for further research. Second, our study throws up some wider themes with broader implications for how music is shared, consumed and performed beyond DJing.

Technology in Support of DJs

We have adopted a wide view that extends beyond what happens in the nightclub and on the dance floor to encompass many other aspects of what it means to be a DJ. While we have presented our data very much in DJ's own terms, we can draw out from it something of a more general process that they tend to follow, a process that comprises a series of distinct activities that are essential to their art.

- **Collecting** – building and maintaining a personal music collection as a prerequisite for other activities
- **Preparing** – selecting music from this wider collection in preparation for a particular gig in the form of crates
- **Performing** – performing a set in a nightclub by playing and mixing specific sequences of tracks, drawn from crates, but improvised in response to the crowd.
- **Promoting** – establishing a profile as an artist and building a network of DJs, producers and promoters so as to obtain bookings and acquire music

As we noted in the introduction, previous research related to DJs has focused on the activity of performing. While this is clearly an essential aspect of being a DJ, an obvious conclusion from our study is that there is also scope to explore technologies that support the other activities of collecting, preparing and promoting, although we suggest that some aspects of performing might also be better supported.

Collecting

In terms of collecting, DJs clearly value both traditional vinyl and newer digital formats, but for different reasons. One aspect of this, the tangibility of vinyl on a platter and the way it affords fine-grained control over mixing, is already recognised in commercial products such as Traktor and Serato Scratch Live that enable DJs to use vinyl disks to mix digital mp3s. However, we have seen that vinyl has other attractive properties too that support the creative process of being a DJ. First, vinyl is a source of old and rare music that can be sampled and otherwise repurposed – and a cheap one at that. Second, being forced to buy the 'whole record', may also promote creativity by encouraging DJs to listen to new tracks, for example 'B-sides'. While online stores are valued for their convenience, flexibility and cost, there is a risk of losing these creative aspects of vinyl. A

key challenge then is to find the online equivalent of the 'B-side' or the rare (and cheap) record.

Preparing

We have seen that a DJ does not turn up to a performance with their entire record collection, but rather prepares a selection of music in advance in the form of a crate. Whether physical or digital, we propose that the crate is of vital importance for three key reasons: it reduces the problem of selecting music on the fly to manageable proportions; it may contain one or more partial sub-orderings of tracks that provide an initial framework to guide live performance; and it provides a safety-net above which the DJ can feel confident to improvise more on-the-fly selections, falling back to the pre-specified order in times of difficulty. Thus, the crate appears to support both practical but also artistic (improvisational), aspects of being a DJ. It is therefore perhaps no great surprise that the concept has migrated from its original physical origins to being a feature of digital DJ software.

Performing

As noted earlier, the activity of performing has been the dominant focus of previous work in this area. Like [11], our study emphasises the importance of the DJ being able to monitor and respond to the dancers. Here, we draw attention to the direct interactions that DJs have with dancers who lean into the booth in order to engage them. We have seen that these interactions may be problematic when the DJ is too busy to respond or wishes to hide sensitive information such as the names of records. One implication is to provide a public service of some kind that enables dancers to find out the names of tunes (in a form that DJs are happy to release) for themselves.

Promoting

The final core activity of being a DJ is promoting oneself in order to build and maintain a profile as an artist. This currently relies on a range of technologies including multiple social networks and forums, as well as the direct exchange of music which acts as a kind of currency among DJs. Like many users of such services, DJs face a general challenge of integration, being required to work multiple channels to reach their audience. Moreover, there is a need to integrate promotion with the other activities involved in being a DJ. Indeed, while it is useful to highlight promotion as an activity, this is not to say that it occurs at a separate time and place from collecting, preparing or performing; rather promotion is an ongoing activity for DJs.

Extending the Notion of the Crate

Our study highlights the importance of the crate to both the practical and artistic aspects of DJing, and we propose that there are opportunities for the design of new digital DJ tools that extend the notion of the crate beyond a simple playlist and provide further support for all of the four key activities discussed above in a number of ways:

Alternative recommendation systems

Recommender systems could be extended to provide suggestions based not only on the kinds of metadata that DJ's value (such as tempo, key, label, era, and artwork), but also on the records currently in a DJ's crate, such as B-sides or remixes of records. Rarity is also important here, and there is a need to recommend tracks that others have not purchased. There is even the possibility of hiding the information that a track has been purchased so as not to draw attention to it. In short, our findings suggest a need for more flexible recommendation systems that operate differently to many of the established principles of online shopping.

Customisable crates

In the assembly of crates, support could be provided for default groupings of records using criteria which are useful when planning and selecting, such as tempo and key. Support could also be provided for partial sub-orderings of tracks that might be associated with different fall back positions, for example technical failures or anticipated crowd responses.

Having observed DJs change the names of tracks in their digital crates to maintain secrecy, we suggest that crates could incorporate 'front' and back' meta-tags for tracks, making an explicit separation between public facing metadata to be seen by others whilst retaining 'hidden' metadata that is useful for searching and planning. Explicit and separable public metadata might support promotion, but also an element of coordination with other DJs and promoters in advance of a gig.

Integrated promotion

Public metadata could then be made available online and to dancers via public displays around the club or perhaps better via mobile phones as these are already routinely used by dancers to coordinate their clubbing experience as described in [16], and also provide a natural way of storing the information for future browsing and even connecting to online stores. Our study highlighted how online channels fail to provide adequate levels of feedback from audiences, especially when compared to the feedback that is directly available from the dance floor. Publishing (appropriately curated) details of the DJ's set to dancers' mobiles may help complete a feedback loop here, tying the DJ's selection during a performance directly back to online channels for sales and promotion. However, the challenge of obtaining negative feedback online, i.e., of learning what audiences do not like, appears to be a deeper one, as many people will surely tend to ignore tracks they do not like rather than commenting on them. Gaining feedback online about 'dislikes' is therefore a challenge for future research.

Broader Implications

Beyond implications for designing new technologies to support DJs, our study raises some wider issues concerned with how people consume and share music in general. In particular, we can shed new light onto a series of previous

studies of how people consume and share music in various everyday settings.

The value of tangible media

In their study of personal musical collections, Brown et al highlight several issues that are pertinent here [5]. First, they note the significance of tangibility, for example of physical CDs, both in terms of easy browsing but also in terms of a sense of the value of possessing an original. Our DJs also value tangibility, albeit of vinyl rather than CDs, but for somewhat different reasons. For DJs, tangibility is in part about enabling physical control on a turntable platter. However, the tangibility of vinyl is also related to unearthing old material when crate digging. Here, the tangible form may be valuable simply because it is not digital (more than for any inherent physical property) and so not easily accessible to others. Also, while old vinyl is useful to DJs it is not necessarily monetarily valuable – indeed our study shows that in some instances vinyl is appreciated because it is very cheap and can be thrown away if not useful.

The importance of the crate

We have highlighted the importance of the crate, both as a practical tool, but also for supporting improvisation. It seems that musical crates also appear in other settings where music is consumed and performed. In their study, Brown et al highlighted the frequent presence of a 'small pile' of new or recently played CDs in the home that tend to live away from the main collection and near to the audio equipment. We suggest that one doesn't have to look too far to see such 'personal crates' in other places, for example the collection of CDs that lives in the car or office, or the songs that are selected to be taken to a party [9]. As with DJs' crates, there is clearly an aspect of convenience here – the rack in the car will only accommodate so many CDs – but there is also an element of creativity as these crates are typically assembled with a specific setting, journey or party in mind. Interestingly, our DJs observed that a crate is not the same as a playlist, which raises a question for future research as to what features may be missing from today's playlists that would offer even greater scope for creative improvisation when playing music in all kinds of settings?

Sharing and hiding music

Voida et al have studied social practices surrounding sharing music on iTunes [21]. They discuss how sharing music in this way raises a requirement for 'impression management', that is additional work to curate one's public collection so as to convey an appropriate image to others. Brown et al also discuss identity management as an important feature of music sharing. In studying the management of physical and digital music collections in the home, Sease and McDonald note how one member of the household often takes on a curational role [17]. Impression and identity management as well as curation are also important to DJs as they seek to build and promote an artistic identity. Our study highlights two important subtleties here. The first lies in copying tunes; while it is

quite acceptable, indeed common, to ask friends for copies of music [5], we have seen that this runs against the general etiquette of being a DJ, in part out of respect for another's investment in building a collection to support a professional practice. The second concerns how DJs wish to keep some aspects of their collections secret while publicising others. For DJs, this goes beyond simply revealing 'cool' tracks and hiding potentially embarrassing ones as part of managing their identity. All of the tracks they play are considered 'cool', but the DJs are cautious about what information is revealed about each track. Thus, our study reveals subtle complexities involved in balancing the promotion of music as publicly as possible (e.g., DJs' own tracks or those expressly given to them for this purpose) versus hiding information about others (e.g., rare recordings discovered during crate digging).

Performance etiquette

Finally, we have seen that the work of the DJ is underpinned by a particular sense of etiquette. While it may be commonplace to send promo tracks to other DJs, there is a clear sense that these are not for general redistribution. It is generally bad form to ask another DJ to borrow a record. DJs are aware of their position in the 'pecking order' of an event and that their sets have to be tailored accordingly. This strong sense of performance etiquette can be seen in other musical communities of practice, albeit with differences of detail. A recent ethnographic study of traditional Irish folk music sessions in pubs and bars highlighted the importance of 'session etiquette' [3], with some striking similarities and differences to our study of DJs. As with DJing, this form of music appears to involve fluidly segueing between individual tunes as part of sets. Also like DJs, the choice of tunes would appear to be as much a social issue as a musical one, although in this case the musicians are trying to choose tunes that others will know and be able to join in with, whereas DJs are choosing tunes that others will not be playing so as to avoid overlaps. It also appears that Irish musicians maintain a working set of tunes – often kept in a notebook – selected from their wider repertoire that they can easily play and that may be prepared with other musicians in mind. Thus, we see that that the sharing and performance of music is governed by various, often subtle, social norms which the designers of new music technologies need to understand and respect.

CONCLUSION

Our ethnographic study has revealed the work involved in being a DJ in terms of a broad set of activities that surround the collection, selection and mixing of tracks for dancers in nightclubs. We emphasise several key points from our study. First, being a DJ involves far more than the actual mixing of tracks in the club, although this is, of course, essential to the craft. The professional practice of DJs involves collecting, preparing, and promoting music as well as performing it. While performance has been the dominant focus for previous research, there is much scope for new technologies to support these other activities too.

Second, it is important to recognise, and design for, the specific sense of etiquette that surrounds these various activities. DJs have particular needs and constraints, and walk a line between promoting their music, which requires the disclosure of information, while keeping other details secret to preserve a competitive advantage. This contrasts with more everyday situations in which music is shared among groups of friends, and raises new requirements for online shopping and sharing services, especially with regard to how meta-data is selectively used and presented.

Finally, we have identified key concepts that, while important to the practice of DJs, also have a wider relevance to how people share music. We have been able to shed new light on the value of tangibility in music media and have highlighted the importance of the 'crate' as a working set of music that is of both practical and creative value. We have been able to comment on the general nature of music sharing in relation to managing identity and curation, and more generally on the subtle etiquette that governs musical performance.

In summary, the work of DJs is both complex and fascinating, and suggests many opportunities for further research, both in terms of supporting this particular community of users, but also in terms of extending our understanding of how people consume music together.

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