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by Robert Prey

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Human reasoning is innately spatial.

[W]e are embodied, situated beings, who comprehend even disembodied communications through the filter of embodied, situated experience [Cohen 2007, 213].

This appears to be why we constantly invoke place- and space-based metaphors to describe our online experiences. We *visit* a website; we join a virtual *community* in *cyberspace*, etc.

However, to take the spatiality of “cyberspace” for granted is to forfeit any critical questioning of precisely how and why this network of networks has been spatialized. As Christian Schmid puts it,

space ‘in itself’ can never serve as an epistemological starting position. Space does not exist ‘in itself’; it is produced [2008, 28].

This is where turning to the late French philosopher Henri Lefebvre becomes particularly useful. In his writings on space, Lefebvre argued that capitalism is not just about the production of things *in* space but, perhaps even more importantly, capitalism is about the production *of* space. Capitalism not only captures preexisting spaces but capitalism must also produce its own spaces in order to reproduce itself. “Capitalism survives through the production of space” Lefebvre [1973, 21] repeatedly argued. In short, Lefebvre insisted on examining the political economy of space and what he called the “*explosion of spaces*” precipitated by capitalism.

We can describe the emergence of the Internet as a contemporary, “virtual,” manifestation of the “explosion of spaces” Lefebvre saw as capitalism’s most transformative feature. The Internet marks the arrival of “multiple new digital spaces supplementing, and interacting with, older Euclidean spaces” [Adams and Jansson 2012, 312-313]. While Lefebvre focused on capitalism’s relationship to urban space and the built environment, I will argue that his theoretical model is flexible enough to account for digital media spaces. This is because Lefebvre’s theoretical approach posits space not as a fixed entity that “pre-exists” human interaction, but as a dynamic set of relations, actively produced *through* sociality, in a constantly mutating process [Peters 2015, 2].¹ In short, Lefebvre offers a process-relational understanding of space [Prey 2012]. By closely examining a particular kind of digital media space – online music spaces – this paper will demonstrate how Lefebvre can help generate a more critical understanding of contemporary music streaming services.

1. The Production of Music Streaming Spaces

Music streaming services are currently transforming how music is being distributed and consumed. On-demand music streaming services such as *Spotify*, *Rdio*, *Soundcloud* and *Deezer*, and personalized Internet radio services like *Pandora* and *iTunes Radio*, have exploded into the mainstream in recent years, after about a decade of gradual development. Taken together they are the fastest-growing sector of the global music industry and represent the future of music distribution and consumption [IFPI 2014].

Music streaming services would not exist today had it not been for the massive disruption precipitated by *Napster* and its peer-to-peer (P2P) successors at the turn of the century. The purpose of *Napster*, according to its founder Shawn Fanning, was as much about creating a community as it was about making music more accessible.² In their facilitation of online music communities, we can understand *Napster* and subsequent file sharing services, in Lefebvrian terms, as “social spaces” produced around the practice of sharing music.³

¹ Following Leibniz, Lefebvre [1991, 83] argues “[...] a space is not a thing but rather a set of relations between things [objects and products].” As well, like Heidegger, Lefebvre argues that “space does not exist in any such absolute, a priori form; it is not something that human activity fills up, but rather something that human activity produces” [Cohen 2007, 232].

² As Fanning put it in an early interview, *Napster* “was rooted out of frustration not only with *MP3.com*, *Lycos*, and *Scour.net*, but also to create a music community” [Varanini 2000].

³ Several academic commentators have focused on how sharing digital music through P2P services facilitated the building of community. Jones [2002] argues that the Internet provides a “new geography” whereby “affective communities” of music are formed. Hughes and Lang [2003] describe

Fifteen years after *Napster* and a decade since *iTunes Store* was launched, the download, as a *Billboard* article puts it, appears to have hit middle age [Peoples 2013]. Digital purchases declined for the first time in 2013, replaced, it seems, by the rapid adoption of music streaming services around the world. The shift to streaming can be seen as an attempt to regain control of digital music, which was lost in the post-*Napster* file-sharing era. The recording industry has largely conceded that if music can no longer be exchanged as a commodity, then the focus should shift towards commodifying the very spaces of music consumption.⁴

Music streaming services can be characterized in Lefebvrian terms as “abstract spaces.” Abstract space is the space of capitalism. Emerging out of the economic and political practices of the capitalist class and the state, abstract space is instrumental space “manipulated by all kinds of authorities” [Lefebvre 1991, 51]. This sets abstract space against “social space”

the space of use values produced by the complex interaction of all classes in the pursuit of everyday life [Gottdiener 1994, 127].

Music streaming services remain social spaces, insofar as they retain a use value for listeners, but they are at the same time abstract spaces. Incorporating the sociality and networking features of P2P file sharing, streaming services create institutionally effective listeners [Ettema and Whitney 1994]; effective in the sense that they can be integrated into the economics of the music industry.⁵

2. Lefebvre and Spatial Triad: Perceived, Conceived and Lived Space

As mentioned above, Lefebvre argued that space is always produced; it does not simply exist as a given. Thus, to explore music streaming spaces from a Lefebvrian perspective is to explore the *production* of such spaces. Fortunately, Lefebvre also

the changes precipitated by *Napster* as a “power shift” from the traditional music industry to new self-organized digital music communities.

⁴ The recording industry’s relationship with streaming services is complex and evolving. Ongoing court cases over royalty rates paid by *Pandora Internet Radio* demonstrate the contentious side of the relationship, while growing major label ownership shares in services such as *Spotify* and *Soundcloud* reveal the extent to which the industry has staked its future on streaming.

⁵ In general, music streaming services generate revenues in two ways. Users can listen free-of-charge to music which is supported by advertising or they can pay a flat-rate monthly subscription charge in order to gain unlimited access to all the music available, and further benefits like offline listening and listening on mobile devices. While some services, such as *Pandora Internet Radio* derive the majority of their income from advertising, others like *Spotify* are heavily dependent on subscription revenues. Overall, ad-supported streaming represents by far the greatest share of streaming listeners [Tschmuck 2013].

provides us with a very helpful model to help us think through the complexity of how all spaces are produced. This model – Lefebvre’s “trialectics of space” – is considered by some to be his greatest contribution to philosophical debates about space. Schmid [2008, 33] for example, claims that Lefebvre’s trialectical model

has no parallel in philosophy and the history of knowledge.⁶

Lefebvre developed his “trialectics of spatiality” in order to overcome binary thinking. It takes into account the complexities of social reality in a manner not possible with the Hegelian and Marxist dialectic, which rests on two contradictory terms in contradiction that are sublated through a third term.

Lefebvre’s trialectical model illuminates how

space is produced *by* and productive *of* a dynamic interplay of material, conceptual, and experiential processes [Nunes 2006, xxi].

Lefebvre [1991, 38-39] referred to these three processes, or “dimensions” of social space as “spatial practice” [space as *perceived* through our senses], “representations of space” [space as *conceived*] and “representational spaces” [space as *lived*]. In other words, space is produced at the nexus where form, concept and practice intersect.

In what follows, I examine the production of music streaming spaces with reference to Lefebvre’s model. In *The Production of Space*, Lefebvre refers to this model in two different ways; the first based on his theory of language and the second derived from French phenomenology [see Schmid 2008]. For consistency, in this paper I will employ Lefebvre’s phenomenological concepts: space as *perceived*, space as *conceived*, and space as *lived*.

3. Space as Perceived

We begin our trialectical analysis of the production of music streaming space with “perceived space.” This phenomenological dimension of spatial production refers to aspects of space that can be grasped by the senses. As Schmid explains:

[i]t comprises everything that presents itself to the senses; not only seeing but hearing, smelling, touching, tasting [2008, 39-40].

As a Marxist, Lefebvre was careful to offer a qualified phenomenological approach [see Lefebvre 1991, 183].

⁶ For Schmid, it is impossible to truly understand *The Production of Space* without understanding Lefebvre’s “three dimensional” dialectic.

“[P]erception not only takes place in the mind but is based on a concrete, produced materiality” [*ibidem*, 38].

Lefebvre describes how

[t]his sensuously perceptible aspect of space directly relates to the materiality of the “elements” that constitute “space” [*ibidem*, 39].

For example, if we think of a typical classroom, we could include the structural elements that are perceived visually and tactilely [four walls, ceiling, desks, seats, lectern, etc.] but also the aural characteristics of a class [the sound of students whispering, the shuffle of books, etc.].

To apply this dimension to the production of digital spaces, and in particular music streaming services, helps to remind us directly of the materiality of ‘cyberspace’. Immediately our attention is drawn to the interface of the particular technologies we use to access streaming services. The interface is where body and machine meet. For Drucker the interface is

not so much a “between” space as it is the mediating environment that makes the experience, a “critical zone that constitutes a user experience” [2011, 10].⁷

In taking a Lefebvrian approach to space it would be misguided to see the interface as *the* space however. Instead, we need to ask ourselves how we *perceive* the interface and how this contributes to the *production* of abstract space.⁸

The first music streaming services were designed for the personal computer. Listeners accessed a streaming service while seated, directly facing their screens, at home or in the office. Whether on a desktop computer or a laptop, the relatively generous screen real estate afforded the display of a rich array of graphic icons and menus, enabling the user to easily and intuitively navigate the service through the standard WIMP interface. On the personal computer therefore, *perceived* space is heavily biased towards visual perception.

Within the music streaming sector however, we can further distinguish between two types of services. The first category includes *Pandora Internet Radio*, *Clear Channel’s iHeartRadio*, *8tracks*, *Songza*, *Slacker* and other “Internet Radio” services.

⁷ The interface is where computational power reveals its inner workings to the user: where “immaterial” data is materialized and interpreted by the user. However, the interface is not simply a portal *to* information. “[T]he structure of an interface *is* information, not merely a means of access to it” [Drucker 2011, 10].

⁸ Lefebvre [1991] argued that spatial design should be considered as one of the productive forces of capitalism. He was of course speaking of urban design and how it guides people through the city, or shapes the way shoppers move through a shopping mall, for example [see Gottdiener 1986]. Nevertheless, we can translate this insight to digital spaces. Web design is similarly crucial in guiding users through the Internet.

The heir to traditional broadcast radio, these services are designed for a “lean-back” experience. For example, *Pandora Internet Radio* presents listeners with a sleek layout designed to simplify interaction. On the other hand, on *Spotify*, *Rdio*, *Deezer* and other “on-demand” streaming services, the listener actively shapes the layout of the interface: building personal playlists, downloading apps, and following friends.⁹ In short, these services are designed for a “lean-forward” experience.

When we contrast streaming services by describing them as either “lean-forward” or “lean-back” we immediately draw attention to how the interface summons and positions the listener’s body. Within the seemingly innocent descriptions of “lean-forward” and “lean-back” we can detect a particular “conceived space,” one that proposes an ideal mode of attention: active versus passive. Richardson [2010] reminds us, the “embodied orientation we have towards different kinds of media interfaces, and the immersive investment of the eyes, ears and hands required of interactive screens” partially determines how much, and what type of attention we pay to any service. This has important implications for how successfully a streaming service is able to produce “abstract space.” It influences how much advertisers are willing to pay to reach listeners, as attention is the currency of all commercial media.

However, there is an inherent and obvious problem in trying to capture the *visual* attention of *listeners*. Music is used to produce an environment for most listeners. Rather than confront the listener face-to-face, music envelops the listener. As Frances Dyson [2009, 4] puts it “sound surrounds.”¹⁰

We listen to music through streaming services typically while working on other projects, messaging friends, or performing a myriad of other day-to-day tasks. After setting up a playlist and hitting play, the streaming service window is minimized to focus visual attention on the task at hand.¹¹ The perceived space of streaming services, in *practice*, thus shifts from a visual to an aural bias.

What interests us here is how algorithmically-enabled music selection contributes to the production of abstract space – the space of capitalism. We can look to the popular *Spotify* application “*Moodagent*” for one interesting example of this attempt to produce aural “abstract space” on streaming services. *Moodagent* delivers

⁹ While Internet radio conceives of itself as the successor to broadcast or terrestrial radio space, on-demand services conjure up the space of the record store. An advertisement for the on-demand streaming service “*Rdio*” explicitly attempts to make this connection. [see *Rdio: Unlimited Music Everywhere*. [n.d.]. Retrieved December 29, 2014, from: https://www.youtube.com/watch?v=wksIZuOxf_0]

¹⁰ Cultural theorists have long argued that music is the most powerful affective agency in human life. As Lawrence Grossberg [1992, 153] puts it, musical environments can “determine the sorts of investments we make and the activities we undertake in their musically constructed space.”

¹¹ We can see here the interplay, and tension, between perceived space and lived space.

mood-based playlists. The service claims to have “the world’s most extensive collection of mood data” which they say enables them “to precisely decode the exact mood of any given track” [PRWeb 2012]. For brands who want to advertise on streaming services, *Moodagent* is useful because it can determine if a specific song embodies the essence of the brand’s message. The brand can then decide to have their ads heard when the listener is enjoying other tracks with the same emotional data and characteristics. In short, *Moodagent* helps advertisers target their message to distinct emotional profiles. Brands are able to target such moods and emotions as “Happy,” “Sad,” “Angry,” “Tender,” “Sensual,” “Fear,” and varied levels of each. *Moodagent*, and advertisers who employ their service, are hoping that with “the resulting ‘vulnerability’ a listener is subject to through music, brands and advertisers would be provided an advantageous [and subconscious] platform for the receiving of their marketing message” [Dahud 2012].

The entire drive behind these developments is the desire to deliver ads with a message or a tone that does not clash with a listener’s identity, mood or state of mind. As the CEO of *Moodagent*’s advertising partner Mixberry Media notes “”[t]he positive reception and retention of the advertiser’s message has a lot to do with the consumer mood” [*ibidem*]. In short, algorithms help “*perceived space*” adapt itself to “*lived space*” in order to produce abstract space.

The rapid adoption of mobile devices – in particular smart phones – has further transformed the “*perceived space*” of streaming spaces. First of all, mobile streaming has taken listening out of the home or office. Continuing in the tradition of the *Sony Walkman* and the *iPod*, mobile streaming listeners can re-claim *lived space* through privatizing the public realm [Bull 2005, 354]. At the same time however, the *perceived space* of mobile streaming must necessarily contend with the new environments and the competition for attention that listening in public space introduces. From the glare of the sun on a screen to the roar of traffic, we are reminded that “digital space” is always embedded in, and interwoven with, “physical space.”¹² This is more than a theoretical claim about the blurring of borders between physical and digital spaces and the arrival of so-called “hybrid spaces” [de Souza e Silva 2006; Frith 2012].¹³

¹² Early discussions of “digital space” can be criticized for the strict demarcations they made between “real” space and “cyberspace,” and between the corporeal and the non-corporeal. “Nothing could be more disembodied than cyberspace” argued Internet pundit John Perry Barlow. “It’s like having your everything amputated” [cited in Nunes 2006, 8]. The novelist William Gibson himself explains that he came up with the term “cyberspace” to suggest: “the point at which media [flow] together and surround us. It’s the ultimate extension of the exclusion of daily life. With cyberspace as I describe it you can literally wrap yourself in media and not have to see what’s really going on around you” [Woolley 1992, 122; cited in Saco 2002, 103].

¹³ “Hybrid Space” as been defined as “a conceptual space created by the merging of borders

Lefebvre's Marxist phenomenology impels us to ask how the shift to mobile streaming – bringing private streaming into public spaces – has affected strategies for producing abstract space.

On the one hand, mobile streaming presents significant challenges in terms of creating “abstract space.” Consider the fact that smart phones spend a lot of time in pockets. This alters a listener's embodied orientation to the device the music is being streamed on. In particular, it further reduces visual interaction with the screen. For ad-supported streaming services this has significant implications. On the personal computer, the relatively generous screen size permits the display of banner ads. Banner ads however, are of little use on mobile devices as mobile users are about half as likely to click on ads as listeners accessing a service on their computer [Jablonski 2011]. One result is that streaming services have attempted to shift from displaying banner ads to playing more audio ads. In place of click-through metrics, solutions such as hands-free, voice activated engagement ads have been developed.¹⁴ However, this has not been a seamless transition. As *Pandora Internet Radio's 2014 Annual Report* states:

[...] our audio and video advertising products are relatively new and have not been as widely accepted by advertisers as our traditional display ads. In addition, the introduction of audio advertising places us in more direct competition with terrestrial radio [...]" [Pandora 2014].

Mobile listening also provides streaming services with opportunities: specifically the opportunity to collect far greater contextual information on listeners. *Spotify* already tracks user behavior in “physical space.” “We track user behavior throughout the day,” explains Gary Liu, head of *Spotify Labs*:

If users are listening to, say, electronic dance music every morning, early in the morning, *Spotify* can be pretty certain that the user is running or exercising, and depending on the frequency and repetition of listening habits, we can know precisely the best time to serve an ad related to fitness [Liu, quoted in Rowley 2014].

Increasingly, wearable “smart” devices will provide continuous data on behavior and context. *Spotify* has indicated that they are interested in developing ways to monitor heart rates and sleeping patterns of listeners so as to more accurately recommend music – and ads of course – that correspond to bodily states [Smith 2014].

between physical and digital spaces, because of the use of mobile technologies as social devices” [de Souza e Silva 2006, 264].

¹⁴ For example, the company *XAPPmedia* provides interactive audio ads that allow listeners to verbally respond to advertised offers.

The crux for successful music and advertising correlation is thus understanding the spatial-temporal context listening is taking place within.

4. Space as Conceived

Let us turn now to the second dimension of Lefebvre's trialectic: "*conceived* space." As Christian Schmid writes:

[s]pace cannot be perceived as such without having been conceived in thought previously [2008, 39].

When Lefebvre refers to "conceived space," he is referring to the dominant "representations of space" that "secrete" society's spaces. Lefebvre identifies conceived space with certain groups in society. Conceived space is

the space of scientists, planners, urbanists, technocratic subdividers and social engineers [...] [Lefebvre 1991, 38].

Digital space is likewise conceived of by select groups of increasingly more powerful specialists: coders, graphic designers, programmers, and engineers. Klaus Ronneberger points out that

[t]he discourse of these specialists is oriented toward valorizing, quantifying, and administering space, thereby supporting and legitimating the modes of operation of state and capital [2008, 137].¹⁵

According to Lefebvre social space is transformed into abstract space through measure. "Abstract space is measurable," writes Lefebvre [1991, 352]. It is with the dimension of conceived space that we begin to grasp the importance of "big data" and "datafication" for the production of abstract space on music streaming services.

On contemporary music streaming services all listening-time is data-generating time. "Datafication" – turning social action into quantified data – is rooted in an ideology that José van Dijck refers to as "dataism":

a widespread *belief* in the objective quantification and potential tracking of all kinds of human behavior and sociality through online media technologies [2014, 198].

Both datafication as a capacity and dataism as a "belief" distinguish music streaming services from previous ways of consuming music.

¹⁵ It is measure that allows for qualitatively heterogeneous spaces to be rendered homogenous and thus quantitatively comparable. This is important because only once something is made abstract and quantifiable can it be exchanged on a market.

We can gain insight into the *conceived* space of music streaming services by investigating how listeners and music are measured and segmented by the leading music data analytics company, *The Echo Nest*. Recently purchased by *Spotify*, *The Echo Nest* claims to have a knowledge base of more than a trillion data points, covering more than 35 million songs and 2.5 million artists. With this vast collection of data, *The Echo Nest* is able to draw out useful correlations between music taste and listener identity.

How does *The Echo Nest* do this? Essentially, they attempt to turn both conversations about music, and music itself, into quantifiable data. To accomplish this seemingly Sisyphean task, *The Echo Nest* conducts semantic analysis of online conversations about music that take place every day, all over the world – millions of blog posts, music reviews, tweets and social media discussions. *The Echo Nest* platform compiles key words found in descriptions of the music and its creator and then links them to other artists and songs that have been described with similar key words and phrases. This data is used to determine song similarities on a more cultural level.

At the same time *The Echo Nest*'s acoustic analysis software processes and classifies music according to multiple aural factors – from its pitch to its tempo to its danceability. “The system ingests and analyzes the mp3, working to understand every single event in the song, such as a note in a guitar solo or the way in which two notes are connected,” co-founder and CTO Brian Whitman has explained.

The average song has about 2,000 of these “events” for the system to analyze. It then makes connections between that song and other song with similar progressions or structures [Whitman, quoted in Darer 2012].

Finally, *The Echo Nest* collects a real-time, dynamic record of the type of music fan you are – your music tastes [artists and songs] and music behavior [favorites, ratings, skips, and bans]. This is called your “Taste Profile.” Taste Profiles are organized into music segments. Such segments are categorized in numerous ways: for example artist- and genre-based segments [i.e. listeners who like Beyonce but also like Punk music]. Other segments are built from listener behavior [i.e. listeners who prefer diversity and discovery].

At the same time, *The Echo Nest* utilizes predictive modeling to analyze streaming music listening behavior in order to identify psychographic/affinity characteristics of listeners.¹⁶ The company accomplishes this by analyzing streaming music listening

¹⁶ *The Echo Nest* cofounder Brian Whitman suggests that the future of listener understanding and segmentation will get deeper into how, when and where people actually interact with music. As he put it “not just what they skip, ban and recommend, but when? Did they just break up with their girlfriend?” [Vanderbilt 2014].

behavior and then comparing music affinity to demographics and lifestyle interests. In doing so, *The Echo Nest* identifies

statistically meaningful relationships between music taste and non-musical information including age, gender and dozens of lifestyle categories [The Echo Nest 2013a, 4].

Lifestyle categories include “Gamers,” “Foodies” or “Jetsetters” – consumer categories that can be targeted by relevant advertisers. With the detailed knowledge of its listeners provided by *The Echo Nest*, a music streaming service like *Spotify* can package its listeners to the advertisers that best align with their interests. This is of course highly attractive to music streaming services, which are desperate to attract more advertisers willing to pay a higher price per thousand listeners [CPM]. Segmented listeners can be better targeted by advertising campaigns. As *The Echo Nest* [2013b] points out, “[w]ith more targeted advertising segments, music services can improve performance to command higher CPMs, while minimizing poorly targeted ads that erode engagement.”

The Echo Nest also uses music taste to predict a listener’s future value and, in particular, to figure out who high-value listeners will be early on so that they can be focused on. In doing so, less attention will be wasted on those listeners who will contribute little advertising value to a service.¹⁷ This is what communications scholar Joseph Turow describes as “marketing discrimination”, whereby

marketers increasingly use computer technologies to generate ever-more-carefully defined customer categories – or niches – that tag consumers as desirable or undesirable for their business [2008, 1].

Like urban planners who design an exclusive upscale suburb far from inner city blight, or map a new expressway through the middle of a low-income neighborhood, big data facilitates the production of a hierarchically ordered digital space. In short, a new type of spatial segmentation is occurring online.

Music streaming services are often contrasted with broadcast radio in order to celebrate their ability to fulfill the deeply personal music tastes of individual listeners. However, we should not be distracted by the constant invocation of “personalization.” To do so is to fall into the mass/individual trap long superseded by what Deleuze [1992] called “control societies.” Indeed, upon closer inspection, it becomes clear that it is not the listener as an individual, but – particularly for ad-supported

¹⁷ One of the problems facing the music streaming sector is that the bulk of ad-supported accounts on services like *Spotify*, *Pandora*, and *Deezer* are inactive. A study conducted by MIDiA Consulting suggests that in 2012 between 60-80% of accounts on ad-supported music services were inactive, “representing users who contribute little advertising value to the service” [The Echo Nest 2013b].

services – the listener as consumer-type that streaming services are interested in.¹⁸ As Deleuze put it

[i]ndividuals have become “dividuals” and masses [have become] samples, data, markets, or “banks.” [*Ibidem* 180].

In short, “personalization” in the music streaming sector, as with other advertiser-supported new media services, is predicated on the development and segmentation of users into ever-more niche consumer categories.

The *conceived* space of music streaming services, in other words, is a hierarchically organized and segmented abstract space of consumer categories. For Lefebvre, abstract space is alienated space.¹⁹ In the Nineteenth century, Marx described the alienation experienced by factory workers confronted by the alien products of their abstract labor. Today, in the Twenty-First century, as we interact with networked digital media, we produce abstract space by feeding data into algorithms we have no control over. The digital space that we contribute to producing confronts us as an alien force. Data-driven, algorithm-enabled music streaming services are but one example of this. Every thumb up, every thumb down, every song skip, ban or favorite feeds into the algorithms that end up building a profile of the listener and categorizing this profile, unbeknownst to the listener.

5. Space as Lived

Lefebvre was particularly critical of the domination that *conceived* space has over space as *lived*. Indeed, he argued that this domination has been essential not only for the production of “abstract space,” but also for the very survival of capitalism. However, this is not the end of the story. *Lived* space, as Michael Gardiner explains, is

where essential human desires, powers and potentialities are initially formulated, developed and realized concretely [2000, 75].

Listeners on streaming services actively construct playlists and program their personalized radio streams. They tag and organize music on these services.²⁰ They follow other streaming service users and share music. On some services such as *Sound-*

¹⁸ Danna and Gandy Jr. [2002, 373] recognized early on that while data mining for marketing purposes “is based on the old idea of relating to customers as individuals, [it] actually rests on segmenting consumers into groups based on profiles developed through a firm’s data mining activities.”

¹⁹ As Wilson [2013] argues persuasively, we need to understand the significance of Lefebvre’s concept of abstract space in relation to his lifelong project of understanding alienation within capitalist society.

²⁰ At *Last.fm*’s peak, users applied approximately 2 million tags per month [Lamere 2008].

Cloud, they collaborate on music production by providing feedback and remixing music. In doing so, streaming users actively contribute to producing the *social* spaces of music streaming services.

Significant contradictions emerge when abstractions dictated by data analytics are projected upon these terrains of everyday music-based practices, but along with contradictions comes the potential for transformation. For example, when *Spotify* first entered the US market in 2011, it required all new users to sign in through their *Facebook* account. Listeners who visited the *Spotify* homepage were greeted with the following message: “You need a *Facebook* account to register for *Spotify*. If you have an account, just log in below to register. If you don’t have a *Facebook* account, get one by clicking the ‘create an account’ link below.” *Spotify*’s integration with the social media giant also meant that any song you streamed would automatically be listed on your *Facebook* wall for all your friends to see.²¹ *Spotify* enthused that this feature “will help everyone to discover more free music than ever before” [Cionci 2011].

Music streaming services like *Spotify* promote the “social” aspect of their services in order to coax listeners to spend more time on their platforms and reveal more data about themselves.²² Signing up via *Facebook* allows *Spotify* to seamlessly gain access to valuable information from a new user. This includes the new users’ name, gender, profile picture, birthday, a list of all of his/her friends, user ID, email address, and any other information the user has made public on *Facebook*. This “sharing” is the very appeal of the service to advertisers, as it allows them to create a “social graph” which they can then use to pinpoint their ads precisely at particular peer groups at particular times. As *Napster* co-founder and *Facebook* shareholder Sean Parker stated:

The dream with *Spotify* was to ultimately integrate *Facebook* and *Spotify* so that that viral distribution of the social graph could be unlocked and that power could be brought to bear for the music industry [cited in Carroll and Knight 2011].

From *Spotify*’s perspective, in connecting itself to *Facebook* and *Twitter*, *Spotify* is able to integrate its social features into already well-established networks rather than having to build these networks itself from the ground up.²³

²¹ Listeners could turn off this option manually in *Spotify*’s Preferences menu.

²² Listeners who linked their *Spotify* accounts to *Facebook* were also found to be three times more likely to become paying subscribers to the streaming service [Dredge 2012].

²³ Importantly, streaming services tend to claim no responsibility for how your data is used by third parties such as *Facebook*. For example, *Pandora Internet Radio*’s privacy policy states, “These service partners may have their own data collection, use, and sharing practices that may also be applicable to your personal information. You should review their applicable privacy policies and methods for changing the privacy or sharing settings on such services” [Pandora 2013].

Gaining insight into the music tastes and listening behavior of its users is also critical for *Facebook*'s business. Music, is a central component of *Facebook*'s Open Graph strategy - an initiative that encourages developers to create applications that let people share movies, books, news articles, and of course music. "Music is such a great example of the [Open Graph]," commented former *Facebook* CTO Bret Taylor, "because it's uniquely tied to people's identities" [Levy 2011]. By gaining access to the listening habits of its users, *Facebook* gets a better sense of *who* you are and *how* you are related to other *Facebook* users. As the tech journalist Eliot Van Buskirk writes:

[i]f your listening habits influence your friends, Facebook knows about it – and also understands that ads targeted to you are more valuable. You're what the marketing types call a "tastemaker" [2011a].

However, deep integration of this sort with *Facebook* was quite controversial and unpopular amongst *Spotify* users, as can be seen in the comments section of technology discussion forums across the web immediately after it was announced. As one commenter wrote on *Hacker News*:

I am sick of everything being social. I listen to and read things I enjoy and often don't want to share it with the whole world [...] I don't want the whole world to know I am listening to jazz radio at the moment.²⁴

It seems that the desire to share cherished music is only matched by the desire to maintain some degree of control over publicizing personal listening habits. As scholars of popular music [ie. Frith 1996] have long demonstrated, we use music not only to achieve pleasure but also to construct our identities. Indeed, there is often a yawning gap between the music we use for pleasure and the music we use to project our identities. In short, there are two types of music: the music we listen to, and the music we tell our friends we listen to. By choosing to ignore this fundamental fact in order to fulfill its data mining dictates, *Spotify* and *Facebook* provoked a backlash.

After just one week *Spotify* was forced to respond to the growing chorus of complaints over their automatic sharing function. *Spotify* CEO Daniel Ek made reference to the backlash by tweeting "[...] we value feedback and will make changes based on it" [Ek 2011]. The service was soon updated to include a "Private Session" function that allows users to control when the music they are listening to will appear

²⁴ A comment from "wastedbrains" on the comment thread at "Hacker News" under the heading "*Spotify* now requires a *Facebook* account to sign up" [available at <https://news.ycombinator.com/item?id=3038815>].

on their *Facebook* feed. In short, *Spotify* adapted their service to the *lived* space of everyday music consumption.

According to Edward Soja, Lefebvre saw “lived space” as

a strategic location from which to encompass, understand, and potentially transform all spaces simultaneously [1996, 68].²⁵

However, space, as Lefebvre argued, is always produced “trialectically,” not only through *lived*, but also through *perceived* and *conceived* processes. We can see the importance of a trialectical approach in this example of resistance to *Spotify/Facebook* integration. While *Spotify* adapted its service to the “lived space” of its listeners, *Spotify*’s new “Private Session” mode was designed as “Opt In” instead of “Opt Out.” It also had to be activated *each* listening session in order to discontinue sharing, or sharing would be automatically enabled again the next time the listener logged in. Recognizing that publishing one’s music-listening habits to *Facebook* is a key part of *Spotify*’s business strategy, one technology commentator called this a “clever move from *Spotify*” [Van Buskirk 2011b].

A year later *Spotify* made it no longer mandatory that listeners have a *Facebook* account in order to sign up to the music streaming service. Again, protests by listeners seem to have swayed *Spotify*.²⁶ However, while *Spotify*’s new registration page boldly displayed the *Facebook* login button at eye-level on the top of the page, the email registration option was hidden in light grey font at the bottom of the page [Jones, 2012]. In short, *Spotify* attempted to placate concerned listeners while simultaneously redesigning its interface so that it would be *perceived* in a way most favorable to the production of “abstract space.” Once again, we are reminded that abstract space is always a work-in-process. *Lived* practices may do much to shape the spaces of music streaming, but such spaces are at the same time produced by spatial *perceptions* and *conceptions*.

As this example shows, abstract space is riddled with contradictions and tensions. Digital space, much like urban space, is the always-conflicted nexus where abstract space and social space collide. This confrontation between abstract and social space is the “essential spatial contradiction of society” [Gottdiener 1994, 127]. On

²⁵ Not everyone agrees on such a reading of Lefebvre. In a carefully developed exposition of Lefebvre’s three-dimensional dialectic, Christian Schmid [2008] admonishes Soja for singling out lived space, or what Soja calls “thirdspace.” Schmid convincingly reminds us that the dialectical model that Lefebvre follows loses all analytical force if it is carved up into independent spaces, some spaces privileged over others.

²⁶ For example see the comment thread under the heading “*Spotify* without *Facebook*” [available at <https://community.spotify.com/t5/Help-Accounts-and-Subscriptions/Spotify-without-Facebook/t5/p/15843>].

music streaming services, the tension between social and abstract space arises through decisions over what listener actions and behavior to measure, how to measure them, and how to establish commensurability amongst listeners who generally do not want to be measured. As Leckie and Given write:

Abstract space can be quantified, measured, and manipulated [units of production, output measures, etc.] but at the same time, people seek to escape the relentless empiricism of abstract space by demanding certain qualitative characteristics of space [rest, relaxation, adventure, etc.] [2010, 231].

We can add “privacy” or “autonomy” to this list of qualitative characteristics. The important contribution that Lefebvre’s critique of abstract space provides, however, is that it helps us move beyond understanding privacy in the liberal individualist sense of “the right to be left alone.” By juxtaposing measured, quantified, abstract space, not with “private space,” but with “social space,” Lefebvre attempts to reassert the primacy of social relations and notions of the collective subject.

6. Conclusion

This paper has attempted to demonstrate how Henri Lefebvre’s influential theory of the “production of space” can help to generate a more critical understanding of transformations in digital music, and in particular, the production of contemporary music streaming services. Lefebvre’s theoretical model provides an entry point through which we can begin to see how music streaming spaces, like all spaces, are produced at the intersection of form, concept and practice. We *perceive* the material form of such spaces through their interfaces as we scan, swipe, and surf our way around these streaming sites. The music we play envelopes us, surrounds us, and “affects” us. The design of the sites we frequent are *conceived* of by data analysts, programmers and engineers, who bring to their work their own representations of space. However, such *conceived* spaces are never uncontested in their dominance. They are always challenged by “*lived* space.” Punctuated by difference, digital spaces morph and refashion themselves to fit the particular needs, desires, and imaginations of embodied human beings who, in turn, create new conceptions of space.

Thus, digital space is constantly under transformation. In short, a Lefebvrian “trialectical” perspective on the production of space necessitates focus on the interplay between conceptions, everyday practices, and perceptions of the array of “material enablements and constraints” afforded by the medium [Hutchby 2001, 453]. Lefebvre’s approach is thus anything but deterministic (the claim long made against

dialectical models). Its strength lays in its analytical potential: leaving open possibilities and uncertainties. As Christian Schmid argues, Lefebvre's trialectic method

permits the formulation of a strategy – without the certainty of achieving the aim [2008, 34].

By giving careful attention to the *perceived*, the *conceived*, and the *lived*, Lefebvre's trialectical model can illuminate the different ways music streaming services produce new abstract spaces of music consumption. Listener measurement – as an abstraction of listener activity – is central to the production of abstract space. This reminds us that abstract space is dependent upon social space. Streaming services must emphasize and encourage music listening and engagement for there to be anything to measure in the first place. The qualitative, in other words, is never completely absorbed by the quantitative. At the same time, the critique of abstract space as alienated space focuses attention on the importance of building “social spaces” – for music and for all endeavors – spaces that foster the full realization of what it means to be human.

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Henri Lefebvre and the Production of Music Streaming Spaces

Abstract: This paper demonstrates how Henri Lefebvre's influential theory of the "production of space" can help generate a more critical understanding of transformations in digital music, and in particular, the emergence of data-driven and cloud-based music streaming services. Lefebvre distinguished between "social space" and what he calls "abstract space" – the space of capitalism. Music streaming services such as *Spotify*, *Deezer*, and *Pandora*, can be understood as the latest stage in the ongoing struggle to transform the "social space" of P2P file-sharing into "abstract space." By giving careful consideration to perceived, conceived and lived processes in the production of space – what Lefebvre called the "trialectics of space" – this paper illuminates the different ways music streaming services and their listeners produce new spaces of music consumption, helping us in turn to develop a more robust critique of abstract space in general.

Keywords: Lefebvre; Abstract Space; Social Space; Music Streaming; Triialectics.

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