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AIMS AND SCOPE

The International Journal of Music Business Research (IJMBR) as a double-blind reviewed academic journal provides a new platform to present articles of merit and to shed light on the current state of the art of music business research. Music business research involves a scientific approach to the intersection of economic, artistic (especially musical), cultural, social, legal, technological developments and aims for a better understanding of the creation/production, dissemination/distribution and reception/consumption of the cultural good of music. Thus, the IJMBR targets all academics, from students to professors, from around the world and from all disciplines with an interest in research on the music economy.

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Editorial

Peter Tschmuck[1]

The April issue 2019 of the International Journal of Music Business Research (IJMBR) opens with the article "Digital enabled experience – the listening experience in music streaming". Bård Tronvoll, Professor of Marketing at the Business School of Inland Norway University of Applied Sciences, analyses the drivers as well as the outcomes of music listening on streaming platforms such as Spotify. His research, based on a face-to-face survey of almost 1,800 respondents, unveils the cognitive, emotional and sensory values of the music streaming listening experience. The main finding of the research is that music listening experience on music streaming services *"(…) is influenced by social factors such as recommendations and social fellowship with musical peers; and it strongly drives loyalty toward playlists"* (p. 6). Thus, the author concludes that music streaming cannot be explained without considering the social dimensions of music listening.

The second article – "An analysis of ticket pricing in the primary and secondary concert marketplace" – by Terrance Tompkins of Hofstra University in New York City is a literature survey on the factors that impact the pricing of concert tickets in primary and secondary markets. The article highlights the way concert promoters set ticket prices below the profit maximizing level, which in turn opens the door for the secondary online ticket companies selling the tickets at new, but higher price points, thus scalping the concert goers. The underpricing of tickets in the primary market can be explained by (1) accommodating the sale of

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complementary goods (parking fees, concessions and merchandise); (2) maintaining the artist's popularity by showing the artist is fair to his/her fans; (3) variations in ticket prices vary due to the date of the event, venue type and seat availability. After examining the role of secondary market actors such as StubHub and SeatGeek, the article proposes solutions for the primary ticket market to minimise the impact of the secondary ticket market.

Silvia Donker, who was awarded the best paper in the Young Scholars' Workshop of the 9th Vienna Music Business Research Days 2018, contributes the third article of this issue. "Networking data. A network analysis of Spotify's socio-technical related artist network" provides a case study on Spotify's related artist network of the Dutch drum & bass band Noisia. It applies network theory and a network method to *"uncover how each actor* [i.e. artists] *… is embedded in networked structures of relationships that provide opportunities, constraints, coalitions, and workarounds"* (p. 73).

This issue rounds up with a book review of "The Music Business and Digital Impacts. Innovations and Disruptions in the Music Industries" by Daniel Nordgård, published as the first volume in the Music Business Research series of Springer Publishing.

The IJMBR is aimed at all academics around the world, from students to professors, from all disciplines and with an interest in music business research. Interdisciplinary papers will be especially welcome if they address economic and business-related topics in the field of music. We look forward to receiving as many interesting papers as possible. Please send paper proposals to music.business.research@gmail.com.

Digital enabled experience – the listening experience in music streaming

Bård Tronvoll[2]

Abstract
This article investigates what constitutes a music listening experience in digital-driven markets and identifies the drivers, as well as outcomes of the experience. The article uses data collected from 1,794 respondents to a face-to-face survey to perform a structural equation modelling. The article reveals that the listening experience is an important mediator that enables artists to strengthen their relationships with fans, through playlists. The experience consists of cognitive, emotional, and sensory values; it is influenced by social factors such as recommendations and social fellowship with musical peers; and it strongly drives loyalty toward playlists. These results suggest that the key concept for understanding digital streaming services is the music listening co-experience, reflecting a social imperative.

Keywords: Music listening experience, co-experience, digital streaming services, loyalty, social fellowship

1   Introduction

Over the past decade, digitalization has changed multiple industries and markets, one of which is the music industry where digital music streaming has enforced a market and business transformation. Transformation addresses the importance and strategic role of new digital technologies and their ability to disrupt customer behaviour and corporate business models (Yoo, Henfridsson & Lyytinen 2010). A large number of external and internal drivers enable digital transformation, although the music industry is primarily driven by the customers' adaptation to technology, through which easy access to music and a desire for a wider range of songs has become crucial to improving the listening experience. There-fore, the digital transformation has significantly affected music listening behaviour and the way listeners experience music.

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The development of technology has resulted in the disruption of traditional, tangible forms in which music, historically, has been bundled, such as LPs or CDs to become intangible and retrieved through technical mobile applications. Due to these changes, music is no longer limited to a certain time and place, indeed, music has become accessible 24/7 and users can stream unlimited amounts of songs, on demand. Thus, listeners have more opportunities than ever before to integrate music into all their activities (Heye & Lamont 2010; Sloboda, Lamont & Greasley 2009), and this has allowed listeners to change the way they interact with, listen to, and experience music (Borja & Dieringer 2016; Nill & Greipel 2010; North, Hargreaves & Hargreaves 2004; Sloboda 2002). This digital transformation also has had a major influence on music listening behaviour, as the listener has gone from being social and 'collectively' oriented in the 'tangible age', to becoming private and individually oriented in the 'digital age'. As part of this development, digital streaming has impacted traditional concepts where, among other things, albums have been replaced by digital music playlists.

The music industry's rapid technological transformation has enabled significant and extensive adaptation in listeners' digital music streaming, through channels such as Spotify, Apple Music and YouTube. 2015 represented a key milestone year for revenue growth globally, when digital music revenues overtook income from physical music formats for the first time (IFPI 2016). The global digital music market in 2018 (IFPI 2019) shows that the primary revenue stream for recorded music is streaming, accounting for 46,9% of total revenues, compared with 24.7% attributable to physical sales. In mature markets such as Scandinavia (e.g. Norway), streaming accounts for more than 72% of total recorded music; in still emerging markets such as the United States, only 55.7% of recorded music is streaming (although an increase of 33.4% from last year). Therefore, it is imperative for record companies and other music industry stakeholders, regardless of the maturity of the streaming market, to understand how digital driven music listening experiences are created and what contributes to users' reliance on digital music streaming playlists.

As digital music streaming has grown, playlists have become more important, such that they provide a common method for listening to music (Komulainen, Karrukka & Häkkilä 2010). As Sam Lee, the U.K. and Ireland editor for the music-streaming service Deezer has argued, *"A playlist is far more than just a track listing. It's about the entire journey: you have to match and exceed the user's expectations throughout. It's not just about sticking together some tracks and off we go"* (Dredge 2016). Leong & Gram (2011) accordingly argue that a new type of listening strategy results from the increased use of playlists, because the playlists grant listeners more control over the specific music they hear, including both the song content and their sequence. Such listeners likely regard music as a resource to meet their needs; a sort of adjustable soundtrack that supports their identity, emotions, activities, and social environments. DeNora (2000) asserts that listeners act as *"personal DJs,"* adjusting their music to different situations and times to tailor the appropriate music to how they feel, the purpose, or the situation. A playlist via a digital streaming service thus introduces new practices and habits and is an appropriate context to use to study the everyday music listening experience (Hagen 2015; Krause & North 2016).

Experience is a key research priority (Jaakkola et al. 2015; Ostrom et al. 2015), and yet, considerations of digital driven experiences in general and in particular digital music streaming experience remain scarce (Lamont 2009). The vast number of customer interactions enabled by digitisation together with decreased control of the experience requires firms to integrate multiple business strategies in creating positive customer experiences. Thus, it has become increasingly intricate for firms to create, manage, and attempt to control customers' experiences (e.g. Edelman & Singer 2015; Rawson, Duncan & Jones 2013). Managers in digital-exposed industries such as the music industry recognise the need to invest in other experience strategies, spanning their offerings, categories, and channels, all to remain competitive in the rapidly evolving technological markets.

Music playlists provide a vital foundation for ensuring popularity, because for a song to become a hit, it needs multiple plays. To increase

the number of plays, each individual listener must be motivated to be loyal to the digital playlist. The music industry therefore seeks ways to design and create digital music playlists, that enhance superior listening value and prompt recommendations as well as the effect of using a music playlist based on loyalty. Generally, considering the growth and importance of digitalization as well as the central role of digital tools and services, it is imperative to understand what drives and constitutes a digital experience. Therefore, this empirical study investigates how recommendations from others in the social setting and a social community might affect the use of digitalized music streaming and music listening experience as well as a person's willingness to be loyal to these digital music playlists. The next section details the conceptualization of a music listening experience, before presenting its drivers and effects. After outlining the survey data, this article details the results and offers some suggestions for further research.

2 Conceptual background and research hypotheses

When listening to music, people receive the sound and also create an experience (Kerchner 2000; Peterson 2006). Establishing a compelling music listening experience within the digital setting represents a central objective for the modern music industry. In light of the complex, rapidly evolving music landscape, marked by rapid technological advances and increasing individualisation, the music listening experience is even more vital to comprehend. Although actors in this domain (e.g., artists, curators, record companies, listeners) cannot fully design listeners' experiences, music playlists can enhance those experiences, as well as listeners' willingness to replay songs multiple times. Not only can the music listening experiences reveal listeners' perceptions, attitudes, and behaviours, but a favourable listening experience can enhance an artist's competitive advantage and engender recommendations, especially if fans experience their favourite songs with friends through repeated listening, which ultimately drives revenue. The possibilities the digital channels create, provide the customer with a new and more active role.

A listening experience begins with interactions between the music signified by artists (represented by playlists) and the listener. Listeners' willingness to include a song in their playlists often also depends on their interaction with their social environment. That is, at the intersection of the individual and the environment, in the form of a specific event or situation, music listening experiences are triggered and form. Listeners create unique experiences through their interactions with the music across different touchpoints, and they respond not only to playlists but also to other elements, such as their social surroundings and environment. Therefore, experiences emerge through an *"iterative circular process of individual and collective customer sense making,"* such that the person's reality is socially constructed (Helkkula, Kelleher & Pihlström 2012: 59). The value realized from such an experience is individually intra-subjective and socially inter-subjective, determined by both social contexts and interactions (Edvardsson, Tronvoll & Gruber 2011).

In the past, the album represented the record company's primary assets and a tool to gain a strong market image and customer loyalty (Allaway at al. 2011). The album market was wholly conceived of and controlled by the record companies; the digital playlist instead has been leveraged in various forms by other members of the value ecosystem, such as DJs and home recorders. It currently is a prominent feature on streaming services such as Spotify and Apple Music. In contrast to their domination over traditional albums, beyond their own branded streaming services (e.g. THIS IS [Universal], Filtr [Sony], Topsify [Warner]), the record companies have scant control over how people compose and distribute their playlists. Although artists and genres still are important to the playlist ecology, they face competition from fundamentally different, "listener-centric" taxonomies such as mood and activity states.

As part of this development, listeners become both co-creators of value and co-owners of the playlist. Their role has extended beyond being passive receivers of value, to the more important function of co-creators of the music listening experience who also co-own the digital playlist. The listeners co-create the music experience together with the music industry actors, making it come to life for themselves. Because the

listener is always a co-creator of music value, a record company cannot deliver music listening value but can only offer value propositions to listeners (Vargo & Lusch 2008). These digital playlists constitute the listeners' own experience, although they also might be important for music listening communities. Digital music streaming gives rise to individual experiences in specific social contexts, resulting in value-in-context (Chandler & Vargo 2011; Edvardsson et al. 2011). Consequently, the strategic goal for music industry actors, beyond listener loyalty, is to achieve customers' active engagement as co-owners and co-creators of music experience value. Music industry actors thus must seek strategies to enhance listeners' active engagement and encourage them to serve as brand ambassadors (James 2013).

We present our theoretical model in figure 1, which summarizes the hypotheses pertaining to the drivers and effects of music listening experience, as we develop next.
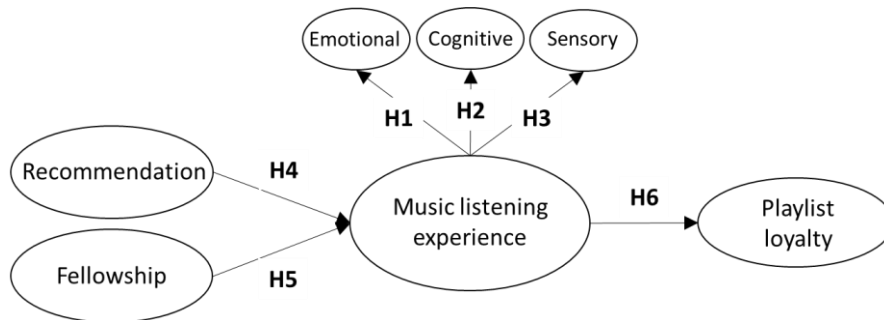
Figure 1: Music listening experience: drivers and effects

2.1 Music listening experience

Dunn (2006) claims that every music listening experience is unique, even for a recording that the listener has heard multiple times, such that every note is the same. Thus, the music listening experience, at the individual level, is not an easily defined concept. However, Hargiss (1966: 96) suggests that it includes *"a variety of introspective reactions such as*

associations, memories, sensations, and other responses of a personal nature." Csikszentmihalyi (2002) describes the music listening experience as having the potential to induce flow in participants. Beyond these insights, relatively few definitions of listening experience are available within the body of music research, so this study turns to other disciplines for relevant definitions of experience. In particular, psychological and behavioural studies distinguish three basic systems or dimensions of experience: sensation, cognition, and affect, each with its own structures, principles, and mutual interactions (Anderson 2015; Goleman 2006; Schmitt & Simonson 1997). In a marketing context, Schmitt (1999) describes experience as the entire living being, including direct observation and/or participation in different events, which can be virtual, dreamlike, or real. He also identifies five types of experiences: sensory (appealing to the five senses, through sight, sound, touch, taste, and smell), affective (appealing to listeners' inner feelings and emotions), cognitive (appealing to the intellect, with the objective of creating cognitive, problem-solving experiences that engage a listener's creativity), physical (acting through bodily experiences, lifestyles, and interactions), and social identity (relating and creating value for customers by providing a social identity and a sense of belonging). Service scholars define experience as *"a service process that creates the customer's cognitive, emotional, and behavioural responses, resulting in a mental mark, a memory"* (Edvardsson, Enquist & Johnston 2005: 151) or *"the internal and subjective response customers have to any contact (direct or indirect) with a company"* (Meyer & Schwager 2007). Brakus, Schmitt & Zarantonello (2009: 53) define (brand) experience as the *"subjective, internal consumer responses (sensations, feelings, and cognitions) and behavioural responses evoked by brand-related stimuli that are part of a brand's design and identity, packaging, communications, and environments."*

Experience is most often viewed as subjective, personal, and at least partially internal (Edvardsson et al. 2005; Meyer & Schwager 2007). Individual listeners might exhibit emotional, cognitive, and sensory responses before, during, and after listening to a song. Furthermore, the music

listening experience is perceptual and highly impressionistic in nature, so even when listening to the same stimulus, listeners have unique experiences, depending on the features they attend to in the acoustic stream (Springer & Schlegel 2016). For this study, experience is specified as a mental process (e.g. perception, interpretation, sensemaking), through which the individual experience is realised. By using a sense making approach (e.g. Weick 2001) to explain the formation of music listening experiences, this study draws on theories from phenomenology (Husserl 1990), focusing on how a person subjectively experiences a lifeworld, consciously or not, and makes sense or gives meaning to the situation. This approach highlights life worlds, inner realism, and circular sense making as central concepts. Sense making-related studies regard an individual experience as a phenomenon that involves subjective, active, dynamic, and collective sensemaking (e.g. Carù & Cova 2003; McColl-Kennedy et al. 2015; Schembri 2006). Circular sense making refers to how a person interprets the surrounding physical and social world, by engaging in cognitive (thinking), emotive (feeling), and sensory (reactions) experiences in the moment. Finally, hermeneutics enriches phenomenology by emphasizing the interpretation of meaning, focusing on personal interpretations of events (Heidegger 1962).

Through social interaction, discussion, and sharing, people also create their individual experience, marked by cognitive, emotional, and sensory value. Cognitive value relates to facts, advice, and guidance that expand knowledge about music-related issues. Emotional value relates to affection, listening, and empathy (Juslin et al. 2008; Ong et al. 1995), which helps listeners vent their feelings, reduce unpleasant or enhance pleasant moods, and cope with or enhance their current listening situation. Sensory value relates to sights, sounds, touches, tastes, and smells that enhance reactions to listening, such that listeners create and recreate their own musical experience by perceiving different musical features through sensory modalities. A listener's ability to *"perceive musical sounds, order them, and reshape extant musical structures is only part of an aesthetic musical experience"* (Kerchner 2000: 32). Taken together, emotional, cognitive, and sensory value are shaped by songs on the

playlist, which signal and become the foundation for the music listening experience. As table 1 shows, this multifaceted phenomenon therefore consists of three sub-constructs: emotional, cognitive, and sensory value. With these arguments, the current study defines the listening experience as an individual listener's internalized (phenomenological) meaning for the music, used to achieve cognitive, emotional, and sensory value, to enhance the current social situation. Formally,

H1: The music listening experience consists of the positive effect of emotional value.

H2: The music listening experience consists of the positive effect of cognitive value.

H3: The music listening experience consists of the positive effect of sensory value.

Constructs	Description	Theoretical sources
Music listening experience	Internalized (phenomenological) meaning of the music, to sustain affective, cognitive, and sensory value and enhance the current social situation	Phenomenology and hermeneutics
Emotional	Derived from inner feelings and emotions triggered by music listening circumstances	Brakus et al. (2009); Irrgang & Egermann (2016)
Cognitive	Derived from reasoning and deep thinking related to music listening circumstances.	Chamorro-Premuzic & Furnham (2007); Chin & Rickard (2012); Zarantonello, Schmitt & Brakus (2007)
Sensory	Derived from sight, sound, touch, taste, and smell associated with music listening circumstances.	Brakus et al. (2009); Schmitt (1999)

Table 1: Constructs to define the music listening experience

2.2 Drivers of the music listening experience

Expanded knowledge about the social and psychological aspects of music reveals that listeners' perceptions of musical performances are influenced not only by factors related to the actual performance but also by non-musical factors (Springer & Schlegel 2016). In particular, the social functions of music and its importance in everyday life are key, as confirmed by demonstrated links of music with social behaviour (Hargreaves & North 1997; North, Hargreaves & McKendrick 2000), the social atmosphere (Laukka 2007), social bonding (Huron 2001), and social identities (North, Hargreaves & O'Neill 2000; Tarrant, North & Hargreaves 2000). Because the music listening experience is phenomenologically determined, formed by a circular sense making process, the exogenous environment also is pertinent. The music listening experience is the outcome of an individual's interaction with the music (e.g. artist, band) and others (e.g. friends, family), as well as self-service technologies (e.g. mobile devices), artefacts (e.g. playlists), symbols (e.g. branded T-shirts) and the social environment.

The importance of social structures suggests that listening activities are driven by the social roles and positions that listeners hold within a particular social group or specific encounter, in that *"institutional and social structures systematically influence consumption"* (Arnould & Thompson 2005: 874). Holbrook (1999) and Scott (2008) argue that institutions, such as social standards, rules, criteria, norms, or ideals, influence evaluations of individual experiences, so the institutions associated with particular music communities drive interactions and listening behaviour. The experience of music shared with others (Juslin et al. 2008; North, Hargreaves & Hargreaves 2004) offers an important channel of communication in social settings (Greasley & Lamont 2006; Rentfrow & Gosling 2006). Social aspects encourage a collective musical experience, which fulfils the requirements of meaning by allowing listeners to go beyond themselves as individuals (Sloboda 2002). The instances of listening to music that people tend to remember, discuss with others, and value the most, generally relate to strong social involvement, with music as the main focus of attention (Lamont 2009).

Previous research also acknowledges the importance of context to understand responses to music, such as the prevalence of particular emotions in social settings (e.g. Juslin et al. 2008). Two prominent social concepts seem important for understanding the music listening experience: recommendations from friends for songs and playlists and belonging to a social community or music fellowship.

Recommendations

The influence of recommendations on behaviour is well documented (e.g. Fong & Burton 2006). Studies of the effects of group pressure on individual judgments even indicate that people modify their own judgments, in response to recommendations by a majority (Asch 1951). Crozier (1997) finds such conformity effects in music listening contexts too. Genuine recommendations entail personal, non-commercial communications about a brand, good, service, or other elements, shared among members of a social network (Arndt 1967; Wilson 1991). Critically, the person recommending a song or digital playlist receives no economic benefit for referring these songs to others. Listeners thus react confidently to positive recommendations from friends and acquaintances and perceive them as more reliable and trustworthy than commercial sources. In the modern market, most recommendations have moved online (Vilpponen, Winter & Sundqvist 2006), where the vast number of weak links in social networks helps spread the information (Barger and Labrecque 2013). In digital networks, messages often feature specific playlist recommendations, which can grow quite influential (Chiou, Hsiao & Su 2014). Although some recommendations may have commercial intent, which is not necessarily revealed to users (Ashley & Leonard 2009), the relationship between recommendations and the music listening experience should be positive:

> H4: Recommendations from others in the social environment enhance the music listening experience.

Fellowship

A social community, through its norms and values, affects members' behaviours. A particular behaviour, such as listening, reflects the accepted terms within the fellowship of the social group (Qu & Lee 2011) and thus helps form the listener's social identity. A social identity implies the self-concept of belonging to certain social groups, which offer some emotional significance and value due to membership of the group (Tajfel 1978). Such social relationships within the community create a sense of fellowship (Gebauer, Füller & Pezzei 2013). At an aggregated level, social capital theory suggests that networks of relationships strongly influence interpersonal knowledge, because sharing takes place (Nahapiet and Ghoshal 1998). Social capital further guides the fellowship and includes access to reciprocal, trusted social connections that contribute to the giving and getting processes (Lu & Yang 2011), resulting in enhanced information exchanges.

With this foundation, it is possible to consider how digital music streaming has influenced the way the music industry actors attempt to engage listeners. Groups of advocates, playlist ambassadors, and emotionally loyal listeners are strategically significant; they have high lifetime value potential, such that they might not only engage in more music listening themselves but also influence other listeners' behaviours and willingness to engage in the fellowship.

A fellowship among music members can be highly developed as a social community, with a shared history, strong inter-dependence, frequent interactions, and closed structures (McLure Wasko & Faraj 2005; Nahapiet & Ghoshal 1998). The personal interactions in social music fellowships encourage the formation of a sense of social belonging. In digital environments, social fellowship can invoke various responses, such as an increasing sense of belonging (Zhao et al. 2012), greater individual participation (Wang & Chiang 2009), and sharing experiences with others (Lu & Yang 2011; Widén-Wulff & Ginman 2004).

H5: A greater degree of fellowship in the social community, increases the music listening experience.

2.3 Effects of the music listening experience on playlist loyalty

Loyalty to the music (or a digital playlist) is a strategic goal for artists and record companies, as well as other actors in the music industry. Loyalty is *"a deeply held commitment to rebuy or patronize a preferred product or service consistently in the future, despite situational influences and marketing efforts having the potential to cause switching behaviour"* (Oliver 1997: 392). Creating and maintaining loyalty helps music industry actors enter into long-term, mutually beneficial relationships with listeners. Listeners' loyalty is a pertinent goal for artists and curators, because loyal listeners spend more time listening to the music and tend to be more willing to pay for the services than other listeners. Loyal listeners also exhibit attachment and commitment to the playlist, such that they are not attracted to other, competing playlist offerings (So et al. 2013). Without listeners' loyalty, even the best-curated playlist cannot succeed. Rather, loyal, long-term users expand their relationships, providing cumulative rewards to other music industry actors (Srinivasan, Anderson and Ponnavolu 2002).

In their quest to develop a loyal base of listeners, most artists and music industry actors continually pursue more favourable listening experiences, which should encourage long-term relationships with listeners. However, competitiveness in the global music market has increased, along with the number of playlists. The co-creation of the music listening experience and listeners' fellowship both offer routes to valuable relationships with existing or potential users (Füller 2010), because listeners feel greater loyalty to artists with whom they develop a strong affinity (Hwang and Kandampully 2012). Consequently, firms have shifted their emphasis, from customer acquisition to customer engagement (Prahalad & Ramaswamy 2004; Sawhney, Verona & Prandelli 2005). In this sense, the music listening experience affects past-directed judgments and also future-directed listeners' loyalty, such that listeners should be less likely to listen to an alternative playlist (Mittal & Kamakura 2001; Oliver 1997).

Loyalty reflects both an attitudinal and a behavioural tendency to favour one playlist over all others, whether due to fellowship norms, convenience, performance standards, familiarity, or comfort with the

playlist. Listening to a music playlist evokes an experience that establishes the basis for more elaborative information processing and inference making, which affect loyalty. Consequently,

> H6: The music listening experience enhances listeners' loyalty to playlists.

3   Research method and procedure

3.1 Research context

Norway, as part of the Scandinavian market, provides an interesting context for investigating digital music streaming. In recent years, it has led in digital music streaming, and maintains a position among the international elite when it comes to the use of digital music (IFPI 2019). Revenues from streaming in 2018 accounted for more than 72% of total revenues from recorded music. Norway's total recorded music market also continues to grow, and digital streaming continues to build market share, whereas downloads have decreased significantly. Because Norway is a leading music digital streaming market, it may reveal new insights into the use of music playlists and listening experiences.

3.2 Data collection and sample

To reveal the underlying structure of the music listening experience, this study used a survey to guide respondents through their listening experience process, framing both the listening process and the social environment. Respondents' impressions thus are expressed in relation to an actual listening experience. The questionnaire was pre-tested by 25 respondents to check for content validity and a few questions were reworded to improve their validity and clarity.

The data set was collected as part of a larger research project, investigating digital streaming and music listening. The survey collected data through personal interviews, with 1,794 respondents, carried out in streets, shopping malls, railway stations, and other public areas, over a

two-month period in spring 2016. To be included in the study, respondents had to be active users of digital music streaming services, whether by their own subscription or by using a family member's or friend's subscription.

A slight majority of the respondents were women (52%). The average age was 29 years (46% 16–24 years of age, 23% 25–29 years of age, and 31% 30 years or older). With respect to education, 54% had no higher education (reflecting the young population), 31% had a bachelor's degree, and 15% had a master's degree or above. In terms of the number of hours they spent listening to music on a normal weekday, 36% listened to music up to 2 hours per day, 42% listened for 3–6 hours, and 22% listened more than 7 hours per day. Finally, with regard to genre popularity, most respondents listened to pop music (77%) or rock (66%), whereas metal, classic, jazz, and blues fans were fairly equally distributed (22%–26%).

3.3 Measures

To develop the items, this study adopted measures that had been validated in prior studies, modified to fit the music context. Music listening experience is operationalised with the three sub-constructs of emotional (four items, Chin & Rickard 2012), cognitive (three items, Zarantonello et al. 2007), and sensory (three items, Brakus et al. 2009; Zarantonello et al. 2007) value. These three sub-constructs represented endogenous aspects that constituted the entity or phenomenon of the music listening experience. All other constructs were exogenous from this phenomenon and considered drivers or effects of the listening experience. The drivers of the music listening experience included the three-item recommendation measure (Ma & Yuen (2011) and the three-item fellowship measure (Chin & Rickard 2012). The effects were summarized as playlist loyalty, with items from Brakus et al. (2009) and Anderson & Srinivasan (2003).

All questions in the questionnaire were formulated as statements, with responses measured on seven-point Likert-type scales (1 = "strongly disagree," 7 = "strongly agree"). Alternatively, respondents

could indicate that a given variable was irrelevant. This study thus used 20 items for six constructs, see table 2.

Model	Main construct	Sub-construct	Items	Factor loading
1	Music listening experience	Cognitive	analyse the complexity of the songs	.80
			admire the technique of the artist	.62
			music is an intellectual experience	.56
		Affective	listen to playlists when I am depressed	.64
			playlists make me feel better	.75
			music takes away tension in the body	.71
			listen to playlists to maintain my mood	.74
		Sensory	music makes a strong impression on all my senses	.72
			the music is interesting on a sensory way	.76
			music provides physical reactions in my body	.64
2	Recommendation		helps me find new music	.77
			helps me raise the quality of my own playlists	.86
			helps me be more independent in my musical tastes	.65
3	Fellowship		similar musical tastes as my friends help me have a better relationship with them	.70
			friendships become better if we like the same kind of music	.74
			I feel closer to my friends listening to the same type of music	.83
4	digital playlist loyalty		I always try to use my playlists when I want to listen to music	.78
			when I want to listen to music, my own playlists are the first choice	.88
			I like to listen to my playlists	.87
			to me, my playlists are the best way to listen to music	.77

Table 2: Constructs and items

The correlations between the constructs fell between .197 and .516, and all Cronbach's alpha values were greater than .77, beyond the recommended threshold of .6 (Nunnally & Bernstein 1994). The descriptive statistics for the constructs, along with their means and standard deviations, appear in table 3.

Constructs	AFF	COG	SEN	FEW	REC	PLO
Music listening experience						
- Affective (AFF)		.356**	.478**	.317**	.285**	.336**
- Cognitive (COG)			.516**	.399**	.273**	.216**
- Sensory (SEN)				.334**	.316**	.329**
Fellowship (FEW)					.316**	.197**
Recommendation (REC)						.245**
Playlist loyalty (PLO)						
Reliability: Cronbach's alpha	.79	.77	.81	.88	.84	.89
Mean	5.02	4.08	4.40	4.33	4.17	5.35
Standard deviation	1.26	1.46	1.30	1.58	1.48	1.34

**Correlation is significant at the 0.01 level.

Table 3: Descriptive statistics

To avoid common methods bias, Harman's one-factor test was executed, as recommended by Podsakoff, MacKenzie, Lee and Podsakoff (2003), with all items entered into an exploratory factor analysis. A common method bias exists if any single factor accounts for most of the variance in the resulting factors. However, no single factor emerged in the analyses, and the first factor (eigenvalue = 6.48) only accounted for 32% of the total variance.

4   Analysis and results

This study used structural equation modelling to investigate the music listening experience construct (Byrne 2001; Jöreskog & Sörbom 1993; Schumacker & Lomax 2004). This technique is widely used in behavioural sciences (Kline 1998) and is suitable for exploring the structure of human constructs (Hull, Lehn and Tedlie 1991). The structural equation methodology usually takes a confirmatory approach, separated into a measurement model and a structural model. This study adopted the recommended two-step approach for model construction and testing (Anderson & Gerbing 1988) and used SPSS 24 and Mplus 7.4 statistical analytical software applications to evaluate the collected data.

4.1 Measurement model

A confirmatory factor analysis served to assess the convergent and dis-criminant validity of the six measurement models (Anderson & Gerbing 1988). The first model established the music listening experience con-struct (emotional, cognitive, and sensory experiences); the second mod-el included the recommendation construct; the third model featured fellowship; the fourth model represented the digital playlist loyalty and the last model represented the overall measurement model, see table 4.

Measurement models	Range of standardized factor loadings[a]	Number of variables	TLI	CFI	SRMR	RMSEA	χ^2 (df, *p*-value)
Model 1: Music listening experience	.559 - .801	3+4+3	.937	.955	.045	.034	1549.2 (45, p < .00)
Model 2: Recommendation	.651 - .864	3	1.000	1.000	.000	.000	274.6 (3, p <.00)
Model 3: Fellowship	.698 - .828	3	1.000	1.000	.000	.000	208.0 (3, p <.00)
Model 4: Playlist loyalty	.765 - .879	4	.996	.999	.010	.011	320.6 (6, p <.00)
Model 5: Overall meas-urement model	.618 - .876	20	.962	.969	.039	.023	4940.5 (190, p <.00)

[a] All factors loadings are significant at *p* < .01, according to the maximum likelihood extraction method.

Notes: TLI = Tucker-Lewis index, CFI = confirmatory fit index, SRMR = standardized root mean resid-ual, RMSEA = root mean square error of approximation.

Table 4: Results from confirmatory factor analyses

The result of the overall measurement model is shown in table 4, which demonstrated high levels of fit, and all factor loadings were signif-icant and greater than the .4 cut-off (Nunnally & Bernstein 1994). In

addition, discriminant validity was established, because all the t-values were statistically different from 1 (Anderson & Gerbing 1982).

4.2 Structural equation model

After confirming the fit of the measurement model, it was possible to use the structural model to test the hypothesized relationships among the six constructs. The test used structural equation modelling (SEM) revealed good overall fit statistics for the model, including $\chi^2(163)$ = 321.47, $p < .000$, comparative fit index (CFI) = .962, Tucker-Lewis index (TLI) = .956; root mean square error of approximation (RMSEA) = .023, and standardized root mean square residual (SRMR) = .045. The χ^2 statistic was significant at the .000 level, which may be related to the large sample size of 1,794 respondents. Model fit was acceptable if the CFI and TLI were equal to or above .90, the RMSEA was less than .08, and the SRMR was below .05 (Bagozzi & Yi 1988; Byrne 1998; Diamantopoulos & Siguaw 2000).

Constructs			Direction	Path coefficient	t-value	Result
Affective	→	Music listening experience	+	.764	15.23	H1 (supported)
Cognitive	→	Music listening experience	+	.693	17.89	H2 (supported)
Sensory	→	Music listening experience	+	.764	13.26	H3 (supported)
Recommendation	→	Music listening experience	+	.333	4.79	H4 (supported)
Fellowship	→	Music listening experience	+	.495	7.63	H5 (supported)
Music listening experience	→	Playlist loyalty	+	.634	11.66	H6 (supported)

Table 4: Path coefficients of the structural model and hypotheses results

The results offered support for all the hypotheses. Music listening experience was a strong construct, with path coefficients ranging between .693 and .764. The influences of recommendations and fellowship were somewhat weaker, though both were substantial and statistically

significant. The relationship between music listening experience and playlist loyalty was both substantial and statistically significant.

5   Discussion

This study confirmed that music listening experience is a key construct for understanding how listeners may be influenced by their social surroundings and the effects on their loyalty toward digital music playlists. The listening experience thus is an important mediator that enables artists to strengthen their relationships with fans, through digital playlists. The music listening experience consists of cognitive, emotional, and sensory values, all of which exhibit high factor loadings on listening experience; the construct also achieves good overall fit. Therefore, the music listening experience as part of the digital streaming is a rigorous and solid construct. Moreover, this study confirms that the music listening experience, despite its digital nature, facilitating private and individual characteristics, depends on social factors, such as recommendation from peers and fellowship. Social fellowship with music peers has the strongest influence on the listening experience, indicating that a sense of belonging and social identity are important elements. In addition, the music listening experience strongly drives loyalty to digital playlists.

Digital streaming accordingly affects the very act of music listening and alters its understanding, in terms of how playlists are used and how listening behaviour itself has changed. Mulligan (2016) blogged that *"streaming has melded discovery and consumption into a single whole,"* which emphasizes the active role of listeners, who often become searchers, distributors, and listeners, all at the same time. In particular, younger generations seem less interested in owning music but instead enjoy the experience of music listening, as part of their social activities. Despite such radical changes, the fundamental relationship between an artist and fans persists, premised on the music itself and the listening experience. The technological shift even emphasizes the music listening experience, rather than the objects that hold the music, as the focus.

Although experience is phenomenologically determined by the individual, it depends on social fellowship and is embedded in the norms and values of music peers. To-date research has mainly focused on individual experience approaches, neglecting social interactions. To reveal the changes driven by digitalization and the social aspects of music listening though, experience must be viewed as a "co-experience," that is, as a music listening co-experience. Co-experience might be described as the process of aggregating individual experiences to a shared attention process, so the listening experience becomes part of a social interpretation process (Battarbee & Koskinen 2005). Co-experience results from creating emotions, meaning, and belonging in social fellowship, through music listening in spite of its digital nature. In this process, listeners jointly contribute to the shared experience in a reciprocal interaction, creating interpretations and meanings from the context and allowing practices to evolve in the social context. Thus, co-experience is driven by social needs for communication and relationships, as well as creativity in collaboration. Shared experiences allow for a range of interpretations by other peers, from the expected and agreeable to the unusual or even deviant; the practices may entail reciprocating, rejecting, or ignoring an experience (ibid.). Therefore, expressing meanings and emotions and feeling a sense of belonging are fundamental to co-experiences through social fellowship.

Moreover, co-experience implies mutual understanding and a context for action, particularly when interacting with technology (Dourish 2004). Interactive technological systems, such as digital streaming services, can support co-experience effectively, by providing mediated communication channels and the possibility to create, edit, share, and view content with others (Forlizzi & Battarbee 2004). Consequently, digital streaming services enable co-experience by providing new channels for social interaction. The co-experience of digital music listening can thus be understood as *a non-linear, recursive process of co-creating a listening solution through interactions with the music itself and social fellowship, to enhance emotional, cognitive, and sensory states of mind*.

Digital playlists have drawn considerable attention among music industry actors, as part of digital streaming services, yet these actors struggle with what to make of the playlist conceptually. In this sense, the music industry has been profoundly challenged by this radical shift, from a physical product and transaction orientation to a streaming and experience orientation. These changes affect the way music industry actors must approach listeners along with their understanding of streaming behaviour, and how to handle digital music playlists. The music listening experience in new digital technology markets promotes the "dematerialization" and fluidity of intangible digital formats in general (Magaudda 2011) and emphasizes *music as a service*. It is not just the unbundling of the album and the dematerialization of music that poses a challenge to traditional corporate strategies. The record industry, since its inception, has relied on a traditional transaction based economic model, selling records, cassettes, CDs, and mp3's for a non-recurring one-time charge. Yet now it is shifting to what appears to be an age of digital streaming, in which listeners simply pay a monthly fee for access to an entire music catalogue, and the net revenue pool is distributed to various rights holders, based on their market share. In this setting, record companies and artists need to get listeners to make a habit of engaging in experiences while listening to music; it is no longer about "making the sale."

The industry-disrupting potential of digitalization demand that firms quickly respond and assemble their digital resources to understand the changed market behaviour. Connectivity, mobility and social networks enable connected customers across all facets of society to completely alter their behaviours and expectations from the actors they interact with Youngjin (Chahal & Dutta 2015; Hess et al. 2016). More importantly, the customer expects firms to not only react to their demands but also to anticipate their future needs before identifying them themselves, putting immense pressure on firms to respond accordingly (Von Leipzig et al. 2017).

Loyalty provides a foundation for sustained competitive edges, so developing and increasing loyalty is a crucial factor in any company's' growth and performance (Aaker 1991; Lee & Cunningham 2001). This

standard applies to the recording industry, where corporate strategies for developing, maintaining, and enhancing listener loyalty have only been implemented at the goods level, such as LPs and CDs. Yet listeners do not have an overt relationship with the album itself and the value system supported by record companies is a loosely coupled system, in which their link to the music experience and the listener is weaker than in many other lines of business (Burnett 2002: 71). The music industry employs concepts like 'artists' and 'genres' as reinforcing "ties" within the marketing to ensure listeners' loyalty is built on their relationship with an artist.

Previously, albums contributed to a form of loyalty, through a focus on a particular, tangible collection of songs that was predetermined for the listener. Playlists diminish the opportunities for artists to create loyalty, because they span a wide range of songs, adopted explicitly to meet individual needs. Therefore, digital playlists are not "the new intangible album"; they are a disruptive new approach that enables listeners to take control in digital-driven music markets and co-experience music listening. The challenges continue as the music industry still tries to deal with digital streaming's dissolution of the album. Artists continue to regard the album as their core creative construct, and many record companies continue to build marketing campaigns and core business models around albums and album release schedules. A music streaming focused approach challenges the very essence and meaning of the record industry's offerings. The market for albums may not disappear, especially among serious fans, but it is just one segment of the market, not *the* market. Independent of the various market segments, music industry actors must find a way to put the music listening experience as part of the digitalization transformation at the top of their agenda, by focusing on social aspects and the music listening co-experience.

6   Limitations and further research

This study provides several new insights into the results of digitalization and the role of digital streaming services and music co-experiences.

However, the study is subject to certain limitations that must be acknowledged. Firstly, the findings are limited by measurement issues. Listening experience is presented as a broad conceptualization, consistent with previous definitions in psychology, organisational behaviour, marketing, service, and management literature. The source studies offer good fit and rigorous results, but this concept has not previously been applied within the music context. Additional conceptualizations of the listening experience might be helpful. Secondly, the use of the survey method means the responses might not be free of personal biases. However, the data were collected during face-to-face interviews, so respondents received personal assistance if needed, thereby reducing possible biases or ignorance. Furthermore, respondents were asked randomly to participate in public places, although the recruitment is not a probability based and thus creates a risk of biased data. However, the large number of respondents (N = 1,794 respondents) reduced the likelihood of inaccurate results. Thirdly this research relies on data collected in a single, limited geographical region so these respondents may not be statistically representative of music listeners in other markets or nations.

Further research should explore how the music listening experience in technologically driven markets relates to social aspects, such as the importance of social identity or social norms. Furthermore, a deeper understanding of music playlists and how the listening experience affects them could result from investigations of sharing propensity, word of mouth, and other pertinent consequences. Finally, it is of interest to gain a deeper understanding of the evolution of the listening experience as markets change, suggesting the need for a longitudinal research design.

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An analysis of ticket pricing in the primary and secondary concert marketplace

Terrance Tompkins[3]

Abstract

This paper examines the various factors and trends impacting ticket pricing in the concert industry through a survey of literature published on the primary and secondary markets. It explores the primary market's motivation to price concert tickets below the profit maximizing level and the role of the secondary ticket market in capitalizing on excess demand by establishing a new price point for tickets in the market. The paper researches recent tools developed by the primary and secondary market stakeholders including the Ticketmaster Verified Fan Program and SeatGeek's "Deal Ranking" algorithm. Legislation associated with scalping in the secondary ticket market in the United States is reviewed. Finally, solutions are proposed for the primary ticket market to marginalize the impact of the secondary ticket market.

Keywords: Concert promotion, concert ticket pricing, dynamic pricing, touring, secondary tickets, scalping

1   Introduction

A New York Post headline read "Shameless Sandy Outrage" with the article arguing that scalpers should be ashamed for cashing in on a Hurricane Sandy benefit concert, taking place at Madison Square Garden. This concert featured performances by Bruce Springsteen, The Rolling Stones, Paul McCartney, Billy Joel, Bon Jovi, Eddie Vedder, The Who and the star-studded line-up sold out within minutes of going on sale. The tickets instantly appeared on secondary ticket sites like StubHub, selling at a minimum 273% mark-up on the face value of the ticket, charging

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$560 per person for seats in the nose bleed section at Madison Square Garden. The most expensive ticket sold for $3,700 and over 900 tickets were available on reseller sites causing the promoter of the benefit show to call out StubHub for their unfair practices (MacLeod 2012). Ticket scalping has been part of the U.S. culture for the past century, but technology has changed the nature of such ticket sales evolving from scalpers hawking tickets outside an arena to sophisticated computer programs snatching premium seats on the Internet. Economists suggest that, despite the rising cost of concert tickets in the primary market-place, they are priced below profit maximizing price levels, thus opening the door for the secondary ticket market by establishing new price points.

2   Primary revenue streams in the music industry

Concert revenue is one of the three primary revenue streams in the North American live music industry. In 2017, the three primary revenue streams in the music industry accounted for over $20 billion in North America:

North American Music Publishing Revenues: $4.3 billion (2017)[4]

North American Recorded Music Revenues: $8.7 billion (2017)[5]

North American Live Music/Concert Revenues: $8.0 billion (2017)[6]

In North America between 2000-2016, concert tickets sales in-creased by 330%, growing the touring industry from $1.7 to $7.3 billion, reaching an all-time high of $8.0 billion in 2017. During that time, con-cert ticket prices increased from an average of $40.74 to $78.93 per ticket.

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[4] http://www.crossroadstoday.com/story/38138746/music-publishing-market-2018-global-trends-market-share-industry-size-growth-opportunities-and-forecast-to-2023
[5] http://www.riaa.com/wp-content/uploads/2018/03/RIAA-Year-End-2017-News-and-Notes.pdf
[6] https://www.pollstar.com/Chart/2018/01/2017YearEndBusinessAnalysis_634.pdf
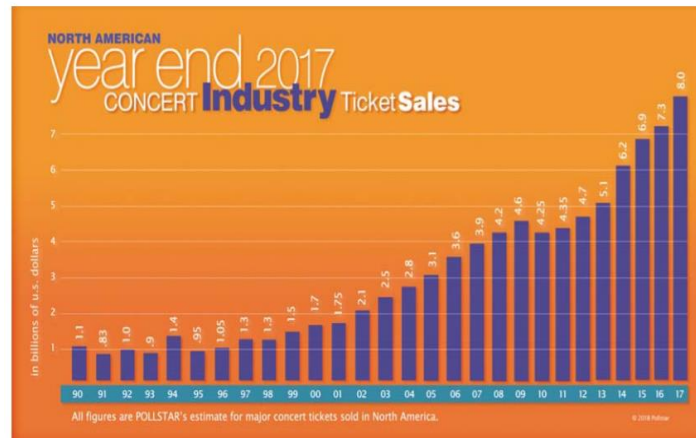
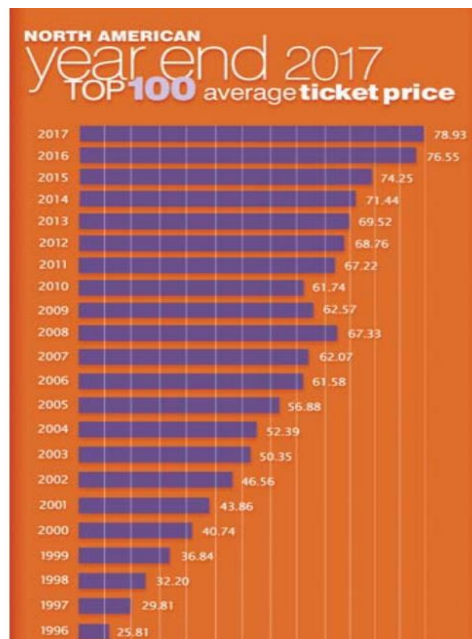Figure 1: Concert ticket sales North America, 1990-2017 (Pollstar 2018).

Figure 2: Average concert ticket price North America, 1996-2017 (Pollstar 2018).

3   The rising cost of concert tickets

In a September 23, 2005 lecture, "Rockonomics: Economics and Public Policy in the Rock and Roll Industry," economist Alan Krueger described his study of the economic causes and effects of the rising cost of concert tickets. Using box office information maintained by Pollstar, Krueger determined that concert ticket prices were growing significantly higher than the Consumer Price Index (CPI). For example, in 2005, concert ticket prices rose 45% faster than the CPI. Krueger found that between 1975 and 1995, concert ticket pricing increased 2% over the rate of inflation, and between 1996 and 2005 concert tickets doubled. Between 2005-2017, the average price of concert tickets increased 88%, from $42.00 to $78.93, a record high.[7]

4   The price of concert tickets in the primary ticket marketplace

Despite the rising cost of concert tickets in the United States, tickets are considered under-priced in the primary marketplace by not achieving their profit maximizing potential. There are three primary considerations for under-pricing tickets in the primary market:

- Ticket prices are set to accommodate the sale of complementary goods (parking fees, concessions and merchandise).

- Ticket prices are set to maintain the popularity of the artist and thus not negatively affect an artists' future income.

- Demand is uncertain and ticket prices vary based on the date of the event, the type of venue and seat availability.

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[7] https://www.pollstar.com/Chart/2018/01/2017YearEndBusinessAnalysis_634.pdf

4.2 Ticket prices and complementary goods

The promoter generally pays a 'guarantee' to the artist in advance and pays the rest of the net revenue from the show according to a 'split rate' after the show. The split rate for artists is usually 85-90 % of the net profits of the concert (Passman 2015). According to Live Nation's Vice President of Marketing Jim Steen*, "85 to 90 percent of the ticket price goes towards artist fees."*[8] Fans buy T-shirts, posters or other products as souvenirs at a concert venue and the promoter will commission merchandising profit as well as ticket sales profit. On average an artist on a major tour receives most of a ticket's face value, while promoters earn most of their profits from ticket surcharges, parking fees, merchandise and concessions. Michael Rapino, CEO Live Nation states, *"Live Nation earns about $4 out of every $100 ticket on the ticket price and I lose $80 million at the door every year. … Every time a consumer walks in the door I earn $12-$14 on the ancillary business"* (ancillary includes parking, merch, concessions).[9]

Sellers within the secondary ticket market gain no benefit on complementary sales. Happel & Jennings (1995) claim the possible existence of other sources of revenue such as complementary concessions sales demonstrates one reason why concert ticket sales are priced below their market price. Total profits are maximized when tickets are priced in the inelastic section of the demand curve. The average ticket consumer buys more complementary goods than the marginal ticket buyer (the one who gets no surplus by attending the performance). Thus, promoters increase the price of complementary goods above the marginal cost and reduce the cost of tickets. By doing so, the promoter improves sales of complementary goods but attracts marginal ticket buyers (Rosen & Rosenfield 1995).

Conversely, the secondary ticket market sets prices according to whatever secures the highest financial return because that market does not have access to complementary profits. Economist James Swofford compares the promoter's profit maximization problem with that of the

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[8] http://www.digitalmusicnews.com/stories/062811tickets
[9] https://revenueanalytics.com/news/ticketonomics

reseller, suggesting that underpricing tickets in the primary market may exist due to the promoter facing uncertainty over sales and being more risk averse, whereas the scalper has a lower cost function. It could also be a result of the promoter having a long-term revenue function in mind, in contrast to the reseller maximising a one-time revenue function (Swofford 1999).

Happel & Jennings (1995) suggest that promoters have a degree of "monopoly power" for a live event due to its uniqueness. To maximize profits a promoter wants a sell-out as this maximizes complementary revenues and introduce the "crowd effect", meaning that consumers who believe a concert will be a sell-out are more attracted to the event and demand for tickets will intensify. According to Krueger, tickets are set below the market clearing level to attract a larger crowd and create a "buzz" that increases demand (Krueger 2009). This crowd effect increases the sales of front row seats and private boxes. Setting the price of certain seats low can help also to encourage demand and create a "ticket line". The creation of a "ticket line" when a concert is in high-demand, with limited capacity events are part of the economic model that compels ticket sales (Happel & Jennings 1995). Fans can quickly lose interest in an artist whose performances do not meet expectations or are suspected of price gouging.

4.2 Artists future income

If an artist believes the price of their ticket affects their popularity, thus impacting future income, they will use that belief to set the price of tickets. Therefore, an artist may price tickets below the market price to maximize future profits (Byun 2008). Diamond (1982) and Swofford (1999) argue that when artists and promoters consider their future recording, tour or merchandising profits as well as their current ticket profits, they may charge lower prices. According to Krueger, to build loyalty from a large fan base (who will attend concerts in the future and buy recorded music), the artist wishes to avoid being viewed as "gouging fans" and will thus set prices below the profit maximizing level (Krueger 2005). To build long-rung popularity, the artist intends to provide fans

with a larger share of consumer surplus than would be the case if the artist were simply maximizing short-run profit. With scalping, the new middleman acts as an intermediary between the promoter and the fan, capturing the surplus meant for the fan. Billy Joel explains it this way:

"The brokers [secondary market ticket brokers] *that drive the prices up are ripping me off because I'm not getting the money ... and they're ripping off the customer because the customer wants the ticket and they know that the market will bear a certain price."*

If Billy Joel knows that *"the market will bear a certain price,"* why would he still underprice his tickets? The answer is that he wants to maintain an image of being fair to his fans to prevent them from being "ripped off" (Krueger 2009). On his 2017 tour, Garth Brooks set an 8-ticket purchasing limit for the $60 ticket, which was set well below market value. Every seat was listed at the same price, therefore the person sitting in the front row paid the same as the person in the nose-bleed section. Brooks performed several shows in each city to satisfy the demand of fans interested to attend the tour. For example, Brooks performed seven shows in Nashville at the Bridgestone Arena, five shows in Indianapolis at Bankers Life Fieldhouse and seven shows in Kansas City at the Sprint Center. Subsequently, he needed to perform 73 shows on the 2017 tour to gross $101 million in box office receipts.[10]

According to Fort (2003) and Krautmann & Berri (2006), concert ticket prices do not capture the full cost of attending a concert. Artists who set ticket prices higher would suffer revenue losses from merchandise sales. Ahn & Lee (2003) suggest that if attendance is habit-forming and fans substitution is small, artists are correct in considering non-ticket (but attendance-dependent) revenue in setting their price while also factoring in the effects of ticket price on future attendance. If a lower price decreases current revenue, the act can make up for the loss with future revenues.

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[10] http://www.kdlt.com/2017/07/18/garth-brooks-puts-fans-first-unique-ticket-sales-approach

4.3 Demand uncertainty

Concert ticket demand is uncertain as ticket prices vary according to the date of the event, type of venue and seat availability. Demand may vary in other unpredictable ways such as at outdoor sports events and concerts that are typically weather-dependant. The stochastic peak-load pricing model deals with situations of aggregate demand uncertainty (Crew, Frenando & Kleindorfer 1995). Aggregate demand uncertainty occurs when demand depends on the weather whereas individual demand uncertainty occurs because many consumers are not able to plan ahead of time. Some consumers only buy their tickets at the last minute when they are sure that they will be able to attend. Demand uncertainty alone does not distinguish ticket markets from markets for other goods and services. What makes this feature crucial is that tickets are perishable goods and lose all value after the performance starts. In theory, promoters could satisfy periods of high demand by holding large inventories of seats as is typically done in many other industries. Because tickets are highly perishable goods, however, the costs of holding large inventories can be quite high. Producers respond to these constraints by choosing venue capacities that may turn out to be too small in some markets. Consequently, capacity constraints may bind, which is illustrated by some performances selling out in minutes.

Supply for concert tickets is limited due to the fixed number of tickets available. The size of venue chosen to host the performance: club, theatre, large theatre, arena, amphitheatre and stadium are all determinant factors of supply by the promoter and artist. Some artists select a venue to deliver intimacy to the ticket holder while a smaller show will create excess demand and a market shortage. For example, in 2000, Paul Simon toured the US playing in theatres (capacity 1,000) as promotion for a new album release, "You're the One". Simon could have performed at 2,500 to 5,000 capacity venues on this US tour. This is considered an "underplay" in the concert industry as Simon underestimated the venue capacity to create intimacy at the performance thereby creating a shortage of supply in the marketplace.

Not all tickets are sold to the public, some tickets are held back from sale to the public by the primary market. These tickets, referred to as "holds" may go to news media, artist, managers, agents, the record company, the fan club, the promoter and the tour sponsor. A few years ago, an investigative team in Nashville unearthed the "holds" list for a Taylor Swift show at the Bridgestone Arena, a venue with a capacity of 13,330 seats. After Swift's fan club, management, agents, record label and opening acts' ticket allocation; after a radio-sponsored presale; and after American Express card members had access to a presale, only 1,591 tickets were made available to the public.[11]
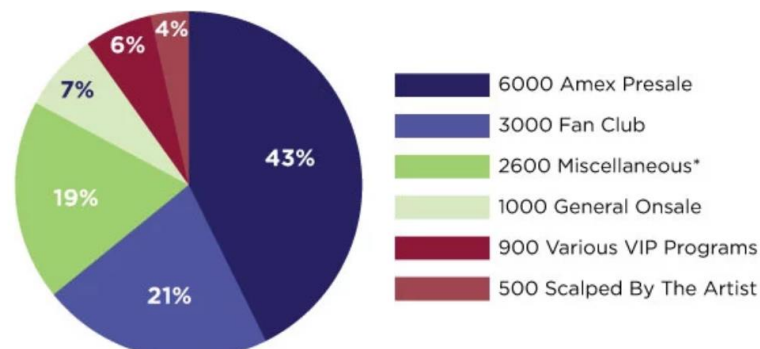

Figure 3: Taylor Swift ticket allocation (NPR, June 2012).

The practice of "holds" is common at popular arena gigs and takes place on a smaller scale at theatres and clubs. Seating location or type of section (front row vs. nose bleeds) and how many days a ticket is purchased before the date of the show are also important determinants of demand and profit margin for promoters. Industry professionals refer to "scaling the house" as the process of pricing the front rows (referred to as the 'golden circle') at high prices and reducing prices all the way to the nosebleed section. The practice of scaling the house varies from performance to performance. Scaled seating arrangements were com-

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[11]   http://www.npr.org/blogs/therecord/2012/06/04/154299904/theres-no-such-thing-as-a-sold-out-concert-even-for-justin-bieber

monly employed at reserved seat rock shows during the sixties, but disappeared for the more youthful pop scene, when promoters introduced general admission tickets in the mid-seventies. Since the late eighties, however, house-scaled seating arrangements were the blue print for pop concerts (Giblin & Chadwell 1994). Artist fees can be covered with highest price premium seats allowing for the rest of the house to be more reasonably priced. For the Rolling Stones Bigger Bang Tour in 1996 top tiered seats went for $250-$500 per ticket. However, 50% of first 15 rows sold in secondary market. Ticket brokers rescale the house *"15-20% of best seats are empirically worth more than face value"* (Waddell 2007). Jeff Fluhr, Co-CEO of StubHub says "[there are] *over 1,000 ticket brokers in the country, taking inventory off the hands of promoters."*

Since the pricing model of promoters and artists is not to optimise profits through ticket sales alone, Connolly & Krueger (2006: 676) state that *"this pricing results in excess demand for many concert performances, which leads to scalping"*. Live music is one of the few businesses in which second-hand goods often sell for more than first hand goods. *"As soon as a show sells out, front-row seats appear on the web for more than face value,"* says Rob Hallett of AEG Live (The Economist 2005). Popular music concert tickets ordinarily resell at prices well above their face values. For example, $39.50 tickets for Nickelback, a popular rock band, concerts were traded at around $120 in the resale ticket market (Byun 2008).

Primary ticket market outlets like Ticketmaster have tried to seize some of the sales revenue of the secondary market by creating their own ticket exchanges (Tickets Now), but this often confuses consumers and creates buyer mistrust. It is not easy for a seller to take advantage of both the primary and the secondary market. According to former Ticketmaster CEO Nathan Hubbard:

"The resale market exists because ticket pricing is not perfectly efficient; supply and demand change over time and some fans wait until the last minute to make the decision as to if they can go to an event. The local ticket brokerage model has been built on this, providing services for

niche groups of customers who seek unique experiences at various price points that the market will bear at any given time."[12]

5 The secondary ticket marketplace

In the past, many concert enthusiasts had to wait in line at a box office for hours prior to tickets going on sale to ensure they could secure a concert ticket. In 2009, StubHub revolutionized the way consumers purchased tickets in the secondary market and its platform StubHub.com was the first major online secondary ticket agent selling tickets exclusively on-line as a ticket reseller. Since StubHub entered the secondary ticket marketplace, secondary ticketing has grown into a multi-billion-dollar industry that allows consumers to access ticket discounts or sold out concerts (Harrington 2012). One-third of all popular concert tickets are purchased in the secondary ticket market (Krueger 2008) and the secondary ticket market has grown to a $15 billion-dollar industry with thousands of ticket resellers on-line. The key sellers for this market are StubHub.com and TicketsNow.com (Harrington 2012).

5.1 Secondary ticket market technology - "BOTS"

Some of these ticket resellers purchase tickets from the primary market using technology to acquire large quantities of the best seats within seconds of the tickets going on sale on the primary market. These "BOTS" are computer programs that can acquire large amounts of tickets automatically without human intervention (Harrington 2012). This process bypasses the human consumer who selects a seat and then enters in payment information through the traditional method within the primary market. The "BOTS" in the secondary ticket market essentially remove the supply of tickets from the typical fan or consumer resulting in a sell-out of tickets. An example of this process was the Justin Bieber North American tour which sold out in less than one hour at rate of more than 1,000 tickets per second (Ganz 2012).

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[12] Ticketmaster.com blog, 2011.

5.2 Secondary ticket market pros and cons

Advantages of the secondary ticket market includes the consumer's ability to obtain access to sold out concerts and the market becomes a one stop shop for all sport games, concert and other events (Burgess 2012). Brokers may be good also for social surplus because they add liquidity to the market (Leslie & Sorenson 2007). However, the secondary ticket market has downsides in that brokers extract surplus for themselves, reducing surplus available to the consumers and subsequently consumers are worse off (ibid.). Ticket prices on the secondary market are subject to change as ticket prices can escalate and a discount may not be obtainable (Burgess 2012). Websites in the secondary market also do not provide any insight to the consumer on future price movements (ibid.). In other words, the consumer is subject to the laws of supply and demand in the secondary market. According to Leslie & Sorenson (2007), seat quality is the key determinant of prices in both the primary and secondary markets as resale prices vary significantly according to seat quality. This is especially true for about twenty percent of the highest quality seats, where resale prices are a particular determinant of seat quality. However, consumers cannot evaluate the quality of the ticket prior to purchase nor judge for themselves if the ticket is a fair price for the seat location. Leslie & Sorenson (2007) cite numerous instances of low-quality seats resold at a higher price than a higher quality seat (for a given event) in their research on the secondary market. This is basic evidence of inefficiencies in the resale market, where on the one hand, the resale market allows price to be a more flexible function of seat quality but on the other hand, some friction in the resale market causes significant variance in price, conditional on seat quality. SeatGeek.com is a website that offers the consumer the ability to compare multiple secondary ticket market websites (Burgess 2012) to determine the best ticket deal based on seat location and price.

5.3 Ticket prices in the secondary market

The primary ticket marketplace drives most of its revenue from complimentary goods and therefore has created a market for alternatives that

maximize profit on ticket sales (Krueger 2008). As a result, consumers are unable to purchase tickets at face value on the primary market, so for consumers to purchase concert tickets, they must utilise the secondary ticket market and pay the true market value price of the ticket. There are three major reasons that may determine the new market value price of a ticket on the secondary market. Firstly, consumers are willing to purchase higher price tickets from reliable websites such as StubHub or TicketsNow but are less likely to purchase tickets from Craigslist or a street scalper because they are considered higher risk and often do not run official businesses (Chan, Mathew & Ruggie 2009).

Secondly, consumers are afraid tickets will not be available in the future, so they buy tickets early when prices are high (Chan 2009).

Thirdly, the supply of the tickets has been dramatically reduced to only a few tickets per concert. This will drive up the price since they are capturing the limited number of people willing to pay a price higher than face value. The secondary market premium is higher for superstar performers who charge the highest prices and tend to sell out in the primary market (Krueger 2009).

5.4 Superstar concerts survey

A survey was conducted by Princeton Survey Research Center on two superstar concerts. The first event was a Bruce Springsteen and the E Street Band "The Rising" tour date at the First Union Center (now Wells Fargo Center) in Philadelphia on October 6, 2002 and the second was a U2 "Vertigo" show at the Madison Square Garden in New York City on November 22, 2005 (Krueger 2008). A total of 858 fans were interviewed for the survey, which revealed that thirty percent (30%) of the tickets were sold on the secondary market. The average face value price of the ticket was $94 while the average ticket purchase price for the secondary market was $245 (ibid.)
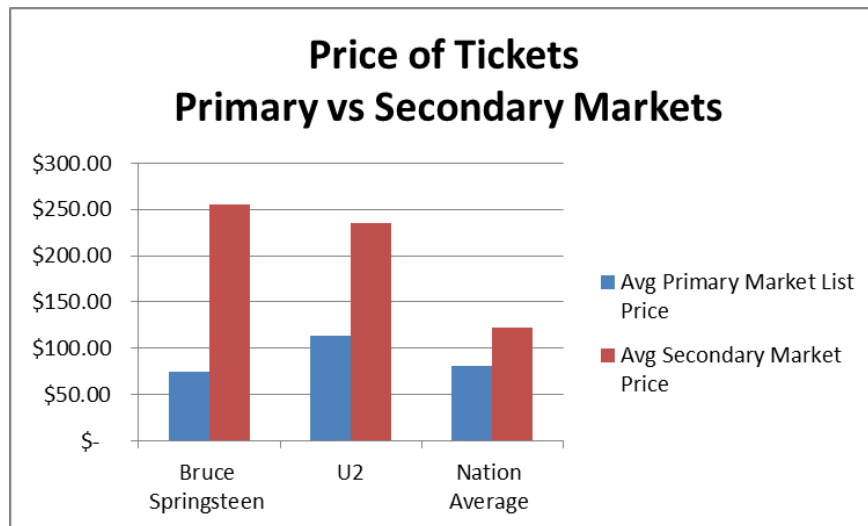
Figure 4: Primary vs. secondary market ticket price survey (Krueger 2008).

The mark up for the secondary market was 240% above face value from the primary market. The Princeton Survey Research Center also conducted a natural survey with a total of 300,000 consumers at 1,068 concerts interviewed for the poll. It was determined that 10% of the tickets were obtained on the secondary market (Krueger 2008). The average face value ticket was $81 and the average mark-up 36%, while the average ticket purchase price for the secondary market was $122 (ibid.*).* Popular artists can demand higher prices on the secondary market.

5.5 Secondary ticket market – consumer uncertainty

In a survey by Sorenson & Leslie (2007), the average mark-up in the secondary ticket marketplace was 40% over face value and 25% of resold tickets obtained mark-ups above 66%. The downside for resellers showed that 28% of tickets were sold below face value and 50% of resale transactions occurred within 24 days of the event in the secondary market. The consumer was not only uncertain about prices in the resale

market, they were also uncertain about which ticket (if any) they would be able to buy in the resale market.

5.6 Timing of ticket sales

The price of secondary market tickets falls as the concert date approaches, because the tickets are a perishable good (Chan, Mathew & Ruggie 2009). As time passes, the challenge of finding a buyer to purchase a ticket well above face value increases, therefore sellers have to drop their prices to find a buyer, otherwise, the ticket is worth nothing (ibid.). The strategy for the secondary ticket market seller is to start with a high price, peak about nine to ten days prior to the concert and drop the price below face value, which increases the number of willing buyers (ibid.). Some of the lowest price tickets can be found within one hour of the concert because the reseller needs to unload the ticket (ibid.).

5.7 SeatGeek and the secondary ticket market

The website SeatGeek.com provides consumers with comparison information to determine if a ticket on the secondary market is a good value (Harrington 2012). This website, like Kayak within the airline industry, gathers ticket prices and seat location on many secondary ticket market websites; it has developed an algorithm to predict the price of the ticket based on three variables: the quantity of supplied tickets on the second ticket market, the location of the seat and the popularity of the concert. SeatGeek compares the asking price of each of ticket to the predicted price and assigns a "deal ranking".

Explaining SeatGeek's Deal Scores
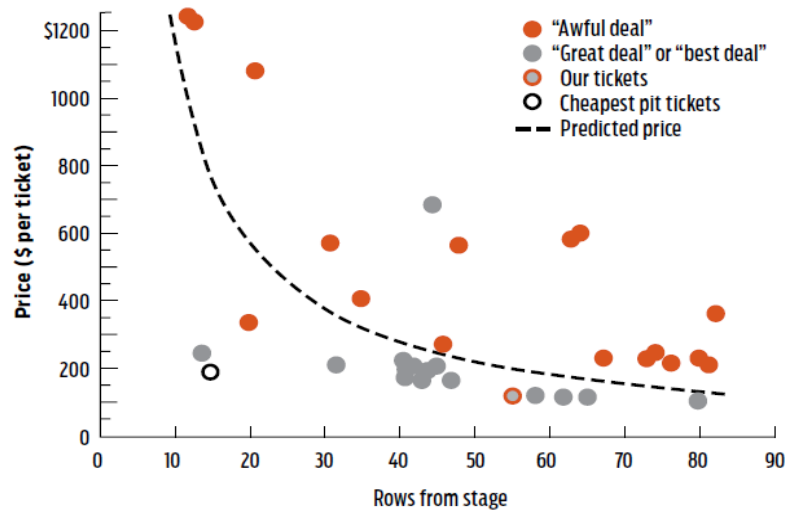
The estimated regression using 86 packages offered on May 28, 2012, is *Predicted Price* = −13.6 + 12078 (1/*Row*) with a t-statistic on the slope of 9.86.

Figure 5: SeatGeek Deal Score (Harrington 2012).

SeatGeek sorts the tickets by their "deal" score which reflects the gap between the asking price and the predicted market price (Harrington 2012). If there are only one or two seats for sale on the secondary ticket market, the predicted price will be higher than if fifty or sixty are for sale for the same show. SeatGeek allows consumers to purchase concert tickets without assuming a high-priced ticket is the only available option. SeatGeek also makes the demand for listing (resell) tickets more elastic (Harrington 2012). Although many consumers purchase tickets exclusively at StubHub which dominates the secondary ticket market with a 25% share, SeatGeek allows smaller secondary ticket market sellers with less popularity than StubHub to gain visibility to consumers, which forces StubHub to keep their prices and fees aligned with the price of the ticket market (ibid.).

6   Proposed solutions for the primary ticket market to compete with the secondary market

Secondary ticket legislation has been prominent for the past hundred years. In 1927, the United States Supreme court upheld a law forbidding the resale of tickets at more than fifty cents in excess of the face price of a ticket (W.F.D, 1927, The Yale Law Journal Review). Despite this judgement, the presiding Supreme Court Justice Sutherland stated that *"ticket scalpers may not be controlled."* Ticket scalping has evolved over the course of the past century; from individual sellers outside of arenas and stadiums to on-line resellers. The secondary ticket has grown to a multi-billion-dollar industry and has been met with opposition from various organizations including the government and primary ticket marketplace sellers.

The current laws around scalping are inconsistent and cannot achieve industry compliance. Anti-scalping laws vary from state to state given there is no federal law that prohibits the resale of concert tickets. Gaining access to tickets, the cost of distribution and fraud are the key challenges that preoccupy regulators (Vascellaro 2005). Massachusetts' ticket resale law allows a maximum ticket mark-up of only two dollars (ibid.), while Pennsylvania allows brokers to resell tickets with a maximum mark-up price of twenty-five percent. New York, Connecticut and Minnesota require a resale license, a fee that is paid to the state. Over time, state laws have recognised the benefits of ticket resales and amended ticket legislation to improve the economic wealth of the state.

The barriers to entry in the secondary ticket market have evolved beyond state legislation. In 2007, Ticketmaster filed a lawsuit against eBay and named StubHub the subsidiary of eBay as a co-defendant. The suit primarily focused on the profit of sales that StubHub gained for a Lynyrd Skynyrd/Hank Williams Jr. "Rowdy Frynds" tour. A Wall Street Journal article explains that StubHub violated Ticketmaster's exclusive right to sell tickets to events at the venues on the tour, including the Conseco Fieldhouse in Indianapolis and the Palace of Auburn Hills, Michigan.

6.1 Paperless ticketing

Primary ticker sellers have attempted to circumvent the secondary market through paperless ticketing technology, which acts as a tool to ensure that the individual attending the event is the same person who purchased the ticket from the primary market. The ticket purchaser is required to show identification at the ticket window of the event, meaning the secondary ticket reseller cannot re-sell tickets from the primary ticket marketplace. In 2009, Miley Cyrus offered a paperless ticket as the only option for her tour (eliminating the ability of the secondary market to gain access to resell tickets for the tour) and Don Vaccaro, CEO of StubHub, claimed that paperless ticketing violated antitrust laws.

The Live Nation/Ticketmaster platform Verified Fan is an attempt to circumvent secondary ticket sales. Vulture.com states:

"In March 2017, Live Nation and Ticketmaster announced their Verified Fan presale technology where fans can register ahead of sale dates by providing personal information that's vetted by the companies. Fans receive a code that allows them to purchase tickets and beat the scalpers at their own game. To date, more than one million users have registered for Verified Fan services. … In addition to partnering with acts like the 1975 and Ed Sheeran, Live Nation/Ticketmaster most recently promoted shows with Twenty One Pilots for five homecoming dates in Columbus, Ohio, taking place at venues of varying sizes between June 20 and 25, 2017, all of them sold out. The spill over to the secondary market was almost non-existent by industry standards, as there were no tickets available for the first three shows on StubHub, and, according to Live Nation/Ticketmaster, the subsequent pair of shows had resales on the secondary market of just 4.1 percent and 3.7 percent. As at the date of the article, available options hovered around 350 tickets per show at arenas that seated up to 18,500 patrons. By using the Verified Fan program, the company had reduced scalping on the secondary market by 90 percent."[13]

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[13] http://www.vulture.com/2017/05/everyone-wants-concert-tickets-but-no-one-is-getting-them.html

According to Live Nation CEO Michael Rapino: *"Music has account-ed for about 80% of Ticketmaster's growth in recent years, making it imperative for us to extend our focus from venues to those artists who are filling the venues."* He estimates that 80 artists utilized Ticketmas-ter's Verified Fan platform, selling 3 million tickets. [14]

The verified fan platform has not been without issues. Digital Music News wrote in January 2018 about *"a serious misfire on Swift's 'Verified Fan' program*." That program gave priority access to certain Taylor Swift fans. Fans were required to build up points — oftentimes by purchasing Taylor Swift products including purchases of Swift's latest album, a snake bracelet and more which theoretically gave fans priority access. Once tickets went on sale, however, that prioritization seemed spotty. Some "prioritized" fans got lucky, but many others were left waiting. Most were given 'special access' to high-priced tickets, while others were forced into the general sales bucket a few days later. Of course, none of that went over well with fans — or their parents. As a result, Digital Mu-sic News headlined: *"Taylor Swift's 'Reputation' Tour is a Flop: Half-Filled Stadiums, Thousands of Unsold Seats, 0 Sellouts."*[15]

6.2 Dynamic pricing

Dynamic pricing, also known as time-based pricing, is one method of price discrimination and is the practice of charging different prices to different consumers for similar goods thus dividing customers into two or more groups with separate demand curves and different prices charged to each group. When successful price discrimination can in-crease the firm's profits by enabling it to capture consumer surplus. This is part of the seller's aim to capture what economists label "consumer surplus" – the difference between what a consumer is willing to pay for a good and the amount they must pay. The price that a consumer is will-ing to pay is the "reservation price". The secondary ticket marketplace has thrived on the concept of dynamic pricing.

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[14] https://www.billboard.com/articles/business/8221386/live-nation-104-billion-record-revenue-2017-q4-earnings-drop-report

[15] https://www.digitalmusicnews.com/2018/01/02/taylor-swift-reputation-tour-flop

Today, internet-based companies can gather large amounts of consumer information through click loggers, ad sites, and search engines operating in many common web functions. Now primary market ticket sellers can compete with the secondary market and utilize dynamic pricing whereas in the past it was more difficult for primary markets ticket sellers to judge individual consumers' reservation prices. Price discrimination is more about separating consumers into groups than aiming at individual consumers. Essentially the process of dynamic pricing is one of "price discovery" where the buyer and seller actively engage in activities that identify the exact highest amount that the consumer would pay for the good before walking away, therefore capturing the entire consumer surplus.

Zach Cross, VP Revenue Analytics states *"Understanding customer buying patterns allows companies to develop price points that meet the needs of price-sensitive customers, the key is making sure you do not displace the high paying demand"*. It is possible for 75% of revenue to be derived from 25% of seats, sourcing VIP packages + Premium Seats.[16] The key is demand forecasting by sourcing variables such as genre, venue, event, section, row and customer segment as well as making optimal inventory allocation decisions. Bill Zysblat of RZO Productions says, *"The idea is to have exactly one person wanting a ticket at every sold-out show".* Dynamic Pricing can significantly improve ticket sale volume for events where interest is low and reduce the number of tickets resold on the secondary market. According to Billboard

"the sales for JAY-Z's 4:44 Tour represents a paradigm shift in concert tickets, by aggressively pricing front row seats, VIP experiences and platinum tickets, concert promoters are getting increasingly more skilled at commanding high prices and record grosses from their best seating inventory. … That's bad news for ticket resellers — by pricing tickets clos-

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[16] https://revenueanalytics.com/news/ticketonomics

er to actual market value, JAY-Z and Live Nation are capturing more rev-
enue and creating little room for brokers to mark up the best seats."[17]

Ticketmaster has recently rolled out dynamic ticket pricing to adjust prices of available tickets based on sales and other metrics pertaining to demand such as StubHub prices, artist popularity and days until the event. They have established that dynamic pricing is a group pricing activity.

In order to understand the effects dynamic pricing has on price, Kauffman & Wang (2001) stated: *"Even though different functional forms have been proposed for the demand-price relationship, there is a consensus that at the aggregate level demand for a product decreases as the price increases under both monopoly and competitive settings."* As a result, we expect that there will be a high demand when the price drops in the group-buying context. The former is a movement along a single demand curve. The latter emphasizes the role of expectations in decision-making and exists by the construction of the group-buying market microstructure. Demand externalities are realised through the upward shift of the demand curve due to potential adopters' high willingness-to-pay. As a result, in the context of group-buying, a price effect is reflected in an increase in orders due to a price drop, while demand externalities are associated with the current group size. Thus, when the current group size increases, demand externalities capture the fact that potential buyers are more likely to place an order due to the expected larger final group size, even though the current price remains the same. With this behaviour in mind they anticipate that when a buyer develops an expectation that the price will drop in the near future, they expect that the likelihood of purchasing the product will increase in a group buying setting.

In the short run, because the price will only drop to the next lower price-tier, a consumer will only be motivated to make a purchase when the reservation price is less than the current price but greater than or equal to the next lower one. In this case, when the price drops to the

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[17] https://www.billboard.com/articles/business/8023168/jay-z-444-tour-highest-grossing-tickets-stubhub

next level, which is no greater than the reservation price, the consumer will get a non-negative surplus from this purchase. In the group-buying setting, when an individual perceives that the price is likely to drop to the reservation price or lower – and the purchase action can facilitate this process – the consumer is more likely to place the order if the consumer is risk-seeking. By contrast, a risk-averse person may wait until the price changes to make the purchase, even if the consumer expected that the price would change. As a result, they expect more orders to be placed right before and right after the price drop point.

Artists are also offering dynamic ticket pricing for concerts through to the primary ticket marketplace. Wilco partnered with concert promoter Higher Ground to offer tickets for a concert sold through a unique combination of "name your own price" auction and lottery. The first 500 tickets were sold to bidders who make the highest offers. Those customers whose bid did not score one of the first 500 tickets were part of an exclusive random lottery. Bidders drawn from a hat were offered the opportunity to purchase a pair of tickets at whatever price they named on their original bid. *"It's an experiment, which we hope proves to be more civilized, fair, and more fun than the standard mode of ticket sales,"* said director Joseph Thompson.[18]

A case study by McAfee & Vera te Velde (2007) of the California Institute of Technology researched dynamic pricing in the airline industry. They classified dynamic pricing as a revenue yield/revenue management tool, a set of pricing strategies aimed at increasing profits. Most yield management research deals with how to maximize revenue. One approach is to assume that customers arrive to request a flight, state the price they will pay, and then the firm decides if to serve them. As you see the interaction between seller and buyer in the airline industry utilizes a system of "Price Discovery". Although this is the broad theory the pricing tools are adjusted to ensure maximum profitability. According to McAfee & Vera te Velde (2007: 4), one variance is that *"within the airline industry rather than dynamically changing prices to maximize revenue,*

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[18] http://www.hypebot.com/hypebot/2012/04/jeff-tweedy-wilco-experiment-with-dynamic-concert-ticket-prices.html

some authors ration capacity with price classes to ensure that high-paying customers are served, effectively implementing a mark-up policy based on remaining capacity and if seat allocation between classes is dynamically controlled, remaining time." This can be accomplished by classifying the high-paying customers as a separate group hence accounting for their needs and utilizing price discover tools on this group separately. The same rule follows through for the economy class travellers this method enables the industry to capture the entire consumer surplus. Thus, the conclusion from the research stating; *"dynamic price discrimination is primarily driven by customer dynamics rather than price discrimination over an existing set of customers"* (ibid.: 33). Dynamic pricing of concert ticket pricing is receiving increasing attention in the industry today because it holds the potential to significantly improve the ticket sale volume for events where interest is low. Secondly, the implantation of dynamic pricing will reduce the number of tickets resold on the secondary market. As adjustments are made on the primary market utilizing consumer information and behaviour to adjust the price on the primary market more efficiently the secondary market may be rendered obsolete. Randy Phillips, CEO of AEG Live states it best, *"dynamic pricing puts the fan on an even playing field with the broker, in terms of access to the best seats in the house, where the market more than greed determines the price of a ticket. It's the ultimate example of laissez-faire economics at work"* (Waddell 2007).

7   Conclusion

Despite the rising costs of concert tickets in the US over the past fifteen years, concert tickets prices in the primary ticket marketplace are not optimized for profit maximization. The three main reasons for not meeting the profit maximizing price point are the benefit of sales from complimentary goods, the artist not gouging the fan to enhance future concert ticket sales and demand uncertainty. Under-priced concert tickets create opportunities for the secondary market to re-establish the market price. Tickets sold on the secondary market are impacted by several

factors: access to best seats, the popularity of the artist and the timing and date of the event. Solutions to battle scalping include legislation, technological advances and dynamic ticket pricing. Dynamic pricing assists the primary market in establishing a profit maximizing ticket price, providing an opportunity to sell tickets at variable prices based on the aggregate demand and lessens the impact of tickets sold in the secondary marketplace.

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Networking data. A network analysis of Spotify's socio-technical related artist network

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Abstract
This is a case study of Spotify's related artist network of Dutch drum and bass artist Noisia, incorporating a critical perspective of data and streaming platforms, it argues that network theory can help deal with the deluge of online data by showing artists and music business professionals how to see relationships instead of mere isolated events. The case study applies network theory and methods within a data-critical context. Three core measures are employed to determine different kinds of powerful actors (as in artists on Spotify) in a particular network. The analysis uncovers how each actor is embedded in networked structures of relationships that provide opportunities, constraints, coalitions, and workarounds. The consequence of the network being algorithm-generated is also considered, as it was found that this creates a situation that differs from regular social networks.

Keywords: Digitization, music industry, Spotify, music streaming, network analysis, sociotechnical system, network centrality

1   Introduction

Since the late 1990's, digital technologies have become increasingly prominent and these very soon had large-scale implications for the music industry.[20] In today's fast-paced permanently connected society, social media and streaming platforms have become of paramount importance for the music industry. These platforms offer previously unknown possibilities to users, audiences and music professionals alike. The endless stream of data and data's associated metrics play a major role in the industry, influencing decisions at every level including what to

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[20] See for example Rose & Ganz (2011); David (2010).

play, who to contract, where to book, who, what and when to include or exclude. It has become fundamentally important for artists to understand what is happening online and where they fit in. The digital environment is relatively new and is constantly changing, and there are still many innovations taking place that impact the user (i.e. anyone using the platform) at any time. The amount of power and control available to any user is relative, as although online platforms enable access to data through figures and visualisations, it is not clear how use of such data realistically offers *insight* indeed merely having data does not confer power and knowledge. The insights must depend on applying a meaningful context or paradigm and the following proposes one such paradigm as a way to deal with data and online platforms namely through networks.

Just as we all shape and are shaped by our environment the same can be said of non-human elements. From a network perspective everything is embedded within the structures of relationships and in network terms all the elements or *actors* play a part as something that can 'bend space around itself' (Callon & Latour 1981: 286). This means all the actors effect (and are affected by) their environment. As opposed to a traditional, reductionist 'group think' that makes the situation appear like things are falling apart, thinking in network terms shows the world as a more diversified, complex and interesting place (Rainie & Wellman 2012: 56). Thinking in network terms thus offers more opportunity to explore the complex reality than approaches that focus on the individual. In music, this can be seen in the difference between claims that an artist's success is due to talent and hard work and acknowledging that the artist reached a certain point because of a collective effort; a result made possible not just by individual characteristics, but also by the relationship with the artist's own environment and ability to access tools that influenced the outcome. Although the idea of networks is not new, the way we are networked today is, and we can use new strategies and skills to address these networked structures that influence our relationships.

The main thesis of this article is that adopting a network perspective and methods of analysis can help music industry professionals in an increasingly fragmented networked society understand the current situation of the digitized music industry including dealing with information from online platforms and guiding decisions on what they offer. This view is examined through an empirical case study: a network analysis of the Dutch drum and bass act Noisia which has been active since the early 2000s, producing electronic music and best known for their drum and bass productions. Noisia are well respected worldwide for their technical skills and consistent quality of their sound design, producing, remixing and regularly collaborating with other artists such as the Prodigy, Foreign Beggars, Katy Perry, Skrillex and Korn. They have received over a dozen awards (for Best DJ, producer, album, track and more) and over time have established three independent record labels to release their own and other artists' music, especially after the major labels dropped out of the Dance genre in the Netherlands (Hitters & Van de Kamp 2010). As DJ's, they regularly perform throughout the world and although their music is part of a smaller sub-genre of Electronic Music, they have managed to become successful in their scene.

Emerging at the time of the digital paradigm shift for the music business and with their music being digital itself, Noisia are true 'digital natives'. As such, they have maintained an active presence on many online platforms, through which they have built a loyal and still growing online following. On Facebook, they have over half a million followers, their YouTube channel has 185.000 followers, Twitter has over 150.000, and around 80.000 individuals keep track of them on Instagram and Songkick. Music streaming platform SoundCloud counts 4 million followers, Spotify 127.000, and Deezer 73.000.

They are building presence on gaming platform Discord; currently with over 2000 members. The majority of Noisia's audience resides in the US and the UK, with London, as the birthplace of drum and bass (Fraser & Ettlinger 2008: 1648), the all-time top city.[21]

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[21] The data and figures from this section come from the accumulated information from Flapper Management, Spotify, Deezer and Next Big Sound profile report, June 26, 2017.

When investigating online tracking and performance data, the example of Noisia is very suitable, given they have a large online fan-base spread across the world, which makes their data reliable for this analysis. The do-it-yourself ethos that came with the digital age made musicians and management more (if not entirely) responsible for choosing their own paths (Hracs 2015: 466, Hesmondhalgh & Baker 2011: 93). In this light, their situation is representative of many artists today who are not signed to any major label, and use the new -found possibilities of working and sharing their music online and releasing it by themselves or through small indie labels.

The case study presents an analysis of Noisia's network of related artists, as this appears on the music streaming platform Spotify. This network does not fit any strict social or technological framework, as it is a social algorithm generated network. Below is an exploration of how and why network theory and methods can help gain insight in this case, and more broadly for the music industry.

2   Data and the music industry

2.1 Digitization of the music industry

At first the music industry adapted slowly to the changing digital landscape. Around 2008 the music business started to find alternative ways of legal distribution and monetisation to deal with the new ways and scale of the production, circulation, access and engagement of music (Nowak & Whelan 2016: 2). In this post-download era, the most popular 'spaces of music consumption' (Prey 2015: 3) became on-demand music streaming platforms. Digital generally now accounts for half of all recorded music revenues (US $7.8 billion in 2016), of which streaming makes up the majority (56%) with Spotify as the leading platform (IFPI 2017). After years of decreasing revenues, since 2015 the industry has seen renewed growth, undoubtedly attributed to streaming services (ibid) and for this case study it is no different as the royalties Noisia earn

from online services, such as those from Spotify are more than all the other sources combined.

Online music streaming platforms cater to the changed (social) environment of today, which is personal and connected, asynchronous and constantly evolving. A major difference between services like Spotify and previous forms of music consumption and distribution is unquestionably the data feedback loop they generate in real time. The audience, made up of loyal and active music consumers who had previously been casted as thieves in the download-era, are now perceived differently, becoming users and subjects whose activities can be monitored, influenced and monetized. The subsequent possibilities of tracking have resulted in a 'datafication of listening' (Prey 2015: 9; Prey 2016: 32), meaning that social action is now transformed into quantified data, making it possible to track behaviour through metrics and allowing for predictive analysis (Dijck 2014: 198). The resulting performance and tracking data from the platforms are partially fed back to the artist, offering them their own data pool of insights on digital music performance Even so it is questionable whether 'the data speaks for itself', and this needs further analysis.

2.2 Dataism, a sceptical approach

The term 'dataism' refers to *"a widespread belief in the objective quantification and potential tracking of all kinds of human social behaviour through online media technologies"* (Dijck 2014: 198). Dataism is a phenomenon that often goes together with a belief in the straightforward 'truth' of data. The endless flow of data being a 'treasure trove' that can easily be put to use by artists and their managers (Mombert 2015; Titlow 2017) using indispensable algorithms (often through third parties) to filter the incoming data flow (Hartnett 2017). Platforms propagate their user-friendly tools and dashboards, which are intended to be simple and insightful for non-analysts (Grow, Next Big Sound).

Sceptics on the other hand take a critical stance towards technology or big data and emphasize its limitations and generative characteristics. Some scholars point out its deceptive use and fallibility (Baym 2012), others the performative effect of technology shaping what they ought to

be describing (Seaver 2012). This sometimes results in expressions of fear or predictions of dark futures (as in Schneier 2015; Harari 2016). Particularly useful here is the term 'socio-technical systems', introduced by Webster et al. (2016). While they specifically refer to recommendation systems, the idea applies to a wider range of data-driven platforms built and formed by humans, the systems being a product of both human and algorithmic effort, and they become 'cultural intermediaries'.[22] For these new cultural intermediaries are "machines (that) have been delegated ethics, values and duties and these are relentlessly, due to their mechanistic qualities, and silently prescribed back to the human," and by that, they play a role in regulating the cultivation of knowledge and taste (Webster et al. 2016). Such sceptic's ideas and concepts ensure we see the systems for what are but the daily reality is these systems are omnipresent, very welcome and useful. Network theory, with its long history of theoretical development, albeit deeply grounded in empirical practice, can help fill this gap.

3   Theoretical framework: networks

3.1 The new social operating system

Since its early days, the internet has typically created a decentralized, open and sharing culture and over time it has remained a network of networks, resembling an eco-system rather than a swiss watch (Rainie & Wellman 2012, Barabasí 2002). As a connected and asynchronous system, the internet allows its users to be more networked than before while being attuned to personal preferences. Societies, like computer systems, are observed to have networked structures that provide opportunities and constraints, rules and procedures (Rainie & Wellman 2012: 12). With this in mind, the current (digitised) music landscape needs a

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[22] The term 'cultural intermediaries' was originally introduced by Pierre Bourdieu (1984), to describe the persons involved in the shaping of taste (such as critics, radio programmers), but did not include technical systems.

suitable perspective for today's society, a 'new logic' as it were to fit the information age: the logic of networks.

3.2 The logic of networks

While network-scientific jargon like *hubs*, *clusters*, *social ties* and indeed the word *network* itself are embedded in everyday language the fact that networks follow quantifiable internal rules and patterns is less well known. Often, there is a reliance on reductionist concepts that simplify environments, attributes or circumstances to an autonomous affair (Barabasí 2002: 6). Network explanations do not assume that environments, attributes or circumstances affect actors independently, nor do they assume the existence of groups (Marin & Wellman 2011: 11-13). The basic concept of network theory is that nothing happens in isolation: everything is linked to everything else (Barabasí 2002: 6). In this 'architecture of complexity' the linked components (usually called *actors*, and the links *ties)* show patterns of connections that are crucial to the behaviour of a system and can indeed be investigated, by representing them in networks (ibid).

Network theory has come a long way since the first abstract mathematical model of random distribution of connections (Erdős & Rényi 1959). Over time theory and models emerged that accounted for the appearance of highly connected subgroups -or *clusters-* (Granovetter 1986, Watts & Strogatz 1998), and later actors with an anomalously large number of ties, called *hubs* or *connectors,* which tend to dominate the structure of the network in which they appear (Barabasí 2002: 64). Findings like these indicate certain actors to be more 'central' than other.

Visualising and analysing a network can uncover how an actor is embedded in structures of relationships that provide opportunities, constraints, coalitions, and workarounds, as these properties are built into their construction (Barabási 2002: 12; Newman 2010:2).

3.3 An additional network perspective

Generally, in social network theory, social networks take *humans* as their actors: the social units that form relations with each other. But *things* too, can express power relations or reinforce social inequalities (Latour 2005: 72). Latour's influential Actor Network Theory (ANT) builds on general network theory, which equates humans and nonhumans both as actors without hierarchy a priori and describes how to explore their collective action (Latour 2005). Using ANT as a theory and methodology to supplement the more general social network theory, one can use social network theory to analyse socio-technical networks such as those encountered through streaming platforms. This ensures an openness to ambiguity that is so vital for any study dealing with social matters.

4   Methods

4.3 Data collection and processing

The principle source of information is the music streaming platform Spotify. On Spotify, the user is presented with a list of artists related to the artist whose page they visit (see figure 1). Under the tab 'RELATED ARTISTS' appears a more extensive list with a maximum of 20 related artists.[23]

As explained on the Spotify Community pages and the FAQ at "Spotify For Artists", related artists are determined by algorithms that look at what people listen to alongside that artist's music as well as "music discussions and trends happening around the internet" (Spotify Community, Spotify For Artists FAQ). The section cannot be changed manually but can be affected by online interaction with the artist's mu-

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[23] This feature has been renamed as 'Fans Also Like', medio 2018 on the Spotify desktop and mobile apps. The algorithm behind it does not seem to have changed, as the results appear to generate more or less the same network (some change is to be expected with the algorithm using the constant flux of user data.) It may be noticed that new name puts more emphasis on the listener (the 'fan') as the driving force behind it.

sic, both on and outside the platform. The precise algorithm, and how it selects 'related artists,' is not publicly available, but the explanations make clear that user activity mainly determines who appear to be one artist's related artists.

Spotify provides related artists for any artist through their API. The use of a crawler (Rieder 2017) revealed the related artists, and artists related to those artists at two steps from the starting point (Noisia). This provided a data set of all the artists and their ties in this range and included for each of them a Spotify-provided attribute 'popularity': a value between 0 and 100, with 100 being the most popular on the platform, and 0 the least popular. The popularity value is calculated by the relationship between the popularity of all the artist's tracks and every other artist on the platform (Spotify for Developers). This revealed an aspect about Spotify's whole artist network, that will be covered later in this article.
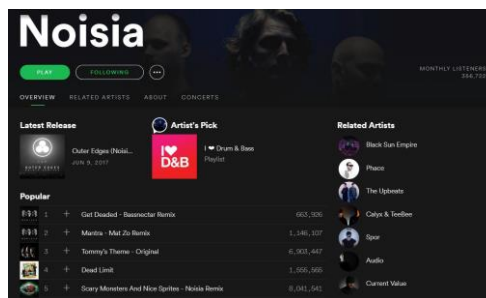

Figure 1: Screenshot of Noisia's profile on Spotify Premium on a desktop PC. Related artists presented on the right, or more extensively under the tab 'RELATED ARTISTS'.

Using this database, all the network graphs in this paper were built in Gephi, whose software renders statistics through built-in features and adds these measurements as attributes to the actors (the artists on Spotify). Three of those measurements have been used for the centrality analyses.[24]

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[24] Algorithms for calculating centralities can differ; Gephi uses the ones by Brandes (2001).

4.2 Centrality measures

The network approach emphasises power and influence as inherently relational (Hanneman 2005). A prominent way to investigate these relations in a network is through the structural attribute of centrality. To determine an actor's centrality, we can refer to a handful of different concepts, of which three shall be treated: degree centrality, betweenness centrality and closeness centrality.

Degree defines the number of direct ties an actor has to other actors in the network. Actors with a high degree are highly visible, and tend to be seen as important, to have more influence, access to information or prestige (Borgatti et al. 2013: 166; Newman 2010: 169). High degree centrality means their position is advantageous in the exchange of information; more ties usually mean greater opportunities because the actor is believed to have more choices. Degree is also seen as important as an index of its potential activity (Freeman 1978: 211). Having high degree is a favoured position, because it gives the actor autonomy and makes them more independent of others (Hanneman 2005).

Closeness aims to define the most central actors in terms of the overall structure of the network. It measures the mean distance from an actor to every other actor. Gephi uses *inversed closeness*, so the highest values reflect the most central actors. The value is calculated by the sum of geodesic distances for a specific actor to *all* other actors. An actor that has a high closeness score is a short distance from most others. Having a high closeness, an actor will be able to obtain information (or whatever flows through the network) originating at a random actor potentially very quickly. When information flows through the network, the diffusion process tends to introduce distortion as the information has to pass every actor. For that reason, one expects information received by central actors to have higher fidelity on average. Thus, a high closeness would seem a significant advantage for an actor to the extent that it can avoid the control potential of others (i.e. their actions being controlled or mediated by others). Logically, shorter distances mean fewer transmissions and depending on the type of network, shorter times and lower

costs, better access to information or more direct influence (Freeman 1978: 224; Borgatti et al. 2013: 173; Newman 2010: 183).

Noisia's network is built from one starting actor (the 'ego' Noisia) and is therefore an *egocentric network* (as opposed to a whole, or *sociocentric,* network) (Marin & Wellman 2011: 19). Usually, to investigate closeness centrality in egocentric social networks is uninformative. When building an egocentric network, the connections normally do not go further than the first-order zone: there is always one step from the ego to any other actor (the 'alter'). All geodesic distances from the ego to the alters would then be 1 by definition (Marsden 2002: 418). The case with this Spotify's network, however, differs for one, the network expands beyond first-order connection, as it incorporates to some extent artists that are also related to Noisia's related artists. Secondly, the network is based on user-generated data, and not Noisia's actual contacts, so it might be interesting to see what the closeness results bring for this socio-digital network and this is included it in the analysis.

Betweenness concerns the flow of information or other traffic and of the influence actors might have over that flow. Betweenness is a measure of how often a given actor falls along the shortest path between two other actors (Newman 2010: 186). More specifically, it is calculated for a given focal actor by computing, for each pair of actors other than the focal actor, what proportion of all the shortest paths from one to the other pass through the focal actor. These proportions are summed across all pairs and the result is a single value for each actor in the network. Betweenness centrality for an actor *j* is given by the formula *b*:

$$b_j = \sum_{i<k} \frac{g_{ijk}}{g_{ij}}$$

where g is the number of geodesic paths connecting *i* and *k* through *j*, and g_{ik} is the total number of geodesic paths connecting actors *i* and *k* (Borgatti et al. 2013: 174). High scoring betweenness-actors are the 'bridges' over which information tends to flow (Granovetter 1973). In general, they have a structurally advantaged position by being in between other actors; it has *"the capacity to broker contacts among*

other actors – to extract 'service charges' and to isolate actors or prevent contacts" (Hanneman 2005). Betweenness is often useful as an index of the potential of a point for control of what flows through the ties (Freeman 1978: 224). It is important to realize that the centralities are not definitions of built-in properties of centrality but rather *hypotheses* about the potential consequences of centrality, either for the actor or the network in which they are embedded (Borgatti et al. 2013: 164).

5   Case study: results

The network graph seen below (figure 2) forms the network visualisation of Noisia's Spotify Related Artists. The overall network is shaped by *Force Atlas2*. This algorithm uses a formula for repulsion and attraction: without links, the actors repulse each other and spread. The ties work as springs that draw the actors together, aiming to produce a layout that shows visual densities that denote structural densities (Jacomy et al. 2014). The appearance of the actors (the artists, the dots) have been modified according to the popularity attribute as indicated by Spotify. The undirected network has 549 actors and 5634 ties. Every actor is an artist whose music can be found on Spotify and every tie is for when Spotify relates one artist to another, linking them to each other through their profile pages. The network consists of one component, meaning every actor is connected to the others within the network, directly or through others. Also, the actors are one-mode, because each of them are single type artists, meaning every actor could conceivably be connected to any other.

A first glance at this network already reveals basic information, such as who the artists in the network are, and who they are connected to. The names were observed of those that appear in Noisia's network, how 'big' they are in terms of Spotify popularity, and where they stand in this network: who seem central, and what names were seen on the outer edges. What particularly stands out in the visualisation (as opposed to tables and matrices of numbers and names) is the appearance, or the shape of the network.

Figure 2: Network visualisation of Noisia's (arrow) Spotify Related Artists. The dots represent the actors (artists) and the ties between them represent a Related Artist link on Spotify. The size and colour of the dots represent popularity as indicated by Spotify.

The spread of the artists is quite expanded and shows some more densely knit areas that seem less connected to the rest. The densely knit areas are clusters of artists. Within those clusters the artists share many ties amongst themselves, their 'relatedness' apparently being very high. For example, in the cluster on the bottom left (shown in detail in figure 3), many ties between those artists can be observed, but as little as four ties link them to the rest of the network, coming from only two particular artists (Infected Mushroom and Juno Reactor). The other actors in this cluster might have a central role in their particular cluster, but without links to the other clusters, Noisia can be quite 'far' from these artists- or in Barabasi's (2002: 61) words, they would *"move in different worlds"*.
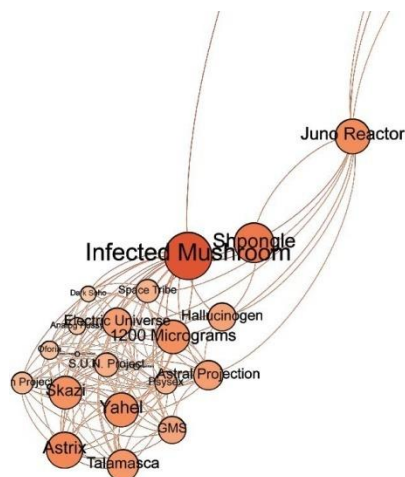

Figure 3: Detail of Noisia's Spotify related artists' network. One of the artists' clusters that appears on the bottom left.

Between those areas with high density are *structural holes*; areas with an absence of ties between the actors. Structural holes can be a source of inequality amongst actors, as they are associated with positional advantage or disadvantage (Hanneman 2005). The artist Magic Mushroom for example, is highly connected inside the cluster, but is also the only one that relates to Noisia's main cluster (through Pendulum,

who is directly tied to Noisia). Typically, this position can therefore fulfil a gatekeeper role for their cluster, or a representative for others (ibid).

What follows is a discussion of the results of the ten actors most central in this network. Some of the aforementioned features will be covered later.

5.1 Centrality measures

Table 1 below shows the results for the actors most central presented per type of centrality. They form structural attributes to each artist. As this is an egocentric network with Noisia as the starting actor from which the network is built, high values for closeness and betweenness for Noisia is not surprising and of little informative value. For that reason, an 11th entry is added for closeness and betweenness, so we can address ten other actors ('alters'). Noisia's results are left in because their values will be addressed later on.

	artist	degree	artist	closeness centrality	artist	betweenness centrality
1	Gridlok	66	Noisia	0.402054292	Foreign Beggars	17283.04319
2	High Contrast	57	Sub Focus	0.393961179	Freestylers	16358.93998
3	Logistics	57	The Qemists	0.393961179	Noisia	14811.78684
4	Teebee	56	Pendulum	0.3856439127	Pendulum	13936.74676
5	Skynet	54	NERO	0.3848314607	Sub Focus	10150.11855
6	Dom & Roland	47	Dieselboy	0.3834849545	Infected Mushroom	9488.672452
7	London El-ektricity	47	High Contrast	0.3832167832	deadmau5	7707.789186
8	Dillinja	46	Freestylers	0.379501385	Dieselboy	7030.578098
9	Current Value	46	Concord Dawn	0.3677852349	Example	6449.388223
10	Brookes Broth-ers	45	Foreign Beggars	0.3675385647	Hadouken!	6177.833136
11			Magnetic Man	0.363395	High Contrast	5447.221447

Table 1: Top central actors for 3 different centrality measures.

Overlap is visible mainly between the actors who are high in closeness and betweenness. Degree shows one actor (High Contrast) that reappears in the closeness and betweenness list. In relation to the rest of the network, table 2 gives an overview of the descriptive statistics of the centrality measures in the overall network. The standard deviation of closeness and betweenness reveal that, although their main actors might be similar, the variety amongst the actors for betweenness is quite big, which is not the case with closeness. This shows clearly in the visualisations of the centralities as well as we will see later on.

	degree	closeness centrality	betweenness centrality
count	549	549	549
mean	20.52459	0.281069	716.677596
std	9.19506	0.036227	1735.252999
min	2	0.218762	0
25%	14	0.251838	33.026142
50%	20	0.279165	172.105946
75%	26	0.305122	601.943473
max	66	0.402054	17283.04319

Table 2: Descriptive statistics for the overall network for three centrality measures.

Although the numbers on their own point to who the central actors are, in combination with a visual representation the top actors can be seen in context of the complete network. For that reason, there is an adjusted visualisation per category of the network in the sections below. Both the values and the visualisations help to investigate the centralities in Noisia's Spotify artists' network.

5.2 Degree centrality

In Noisia's network, degree centrality has a range from 66 ties (Gridlok) to 2 ties (Fat Freddy's Drop and Mighty Dub Catz) and Noisia themselves have a degree centrality of 27, not appearing in the top ten. The top

degree actors are not evenly spread in the network (figure 4); they are all situated near to Noisia's position, in the densely knit upper area. For being in more or less the same cluster, this suggests there is a close relatedness amongst these top actors. The lower values are strikingly visible in the mid-right and bottom-left.
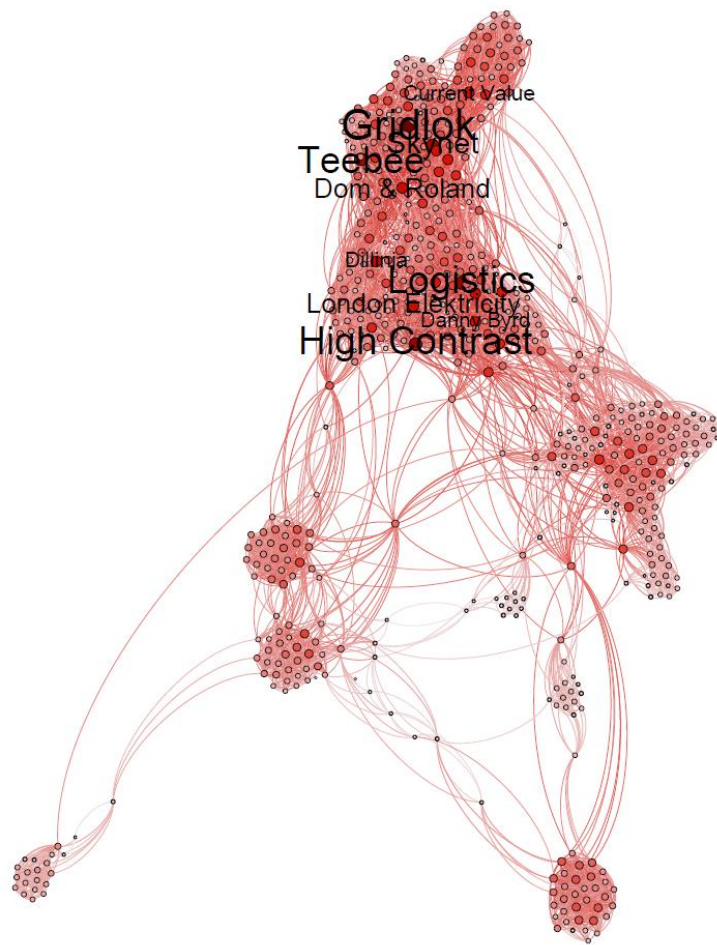

Figure 4: Noisia's Spotify Related Artist Network highlighting the top 10 actors with highest degree centrality. The size of the dots (small-large) are according to degree (low-high).

5.3 Closeness centrality

Closeness centrality relates to the actors most closely connected to others in the overall structure of network. Closeness centrality in this network ranges from 0.402054292 (Noisia) to 0.218762 (DJ IQ). As Noisia is our starting point, their values naturally appear at the top. This is not interesting as it is self-evident, and therefore Noisia will not be considered. The remaining top ten for closeness, are the actors with the smallest mean distance to others. As we can see in the next network graph (figure 5), the high closeness actors seem come from the centre of the graph, and fan out to the edges of the network to those actors with lowest closeness centrality; the actors with the highest closeness centrality are quite literally central.

5.4 Betweenness centrality

Betweenness centrality measures how often an actor falls on the shortest path between other actors. The range for betweenness in Noisia's network goes from 17283.043191 (Foreign Beggars) to 0.0 (for 5 actors). Noisia is #3 with a betweenness of 14811.78684. Again, this should ignore Noisia since having a high betweenness position is of little interest given they cannot be in between themselves. The next ten high betweenness actors are, therefore, highlighted in the visualisation of the network betweenness (figure 6).

This image is undoubtedly very different from the previous ones. The range of values are much larger, and the visualisation reflects this. The top betweenness actors stand out significantly because of these differences. The spread stands out as well: in this case the lower regions are included in the top ten as well, while with the other two centralities the central actors were closer to Noisia. The position of these high betweenness actors reflect what is characteristic for this measurement: high betweenness actors are called bridges as their position typically falls in between clusters of actors. The highlighted actors in the network graph show ties that connect otherwise much more separated clusters.
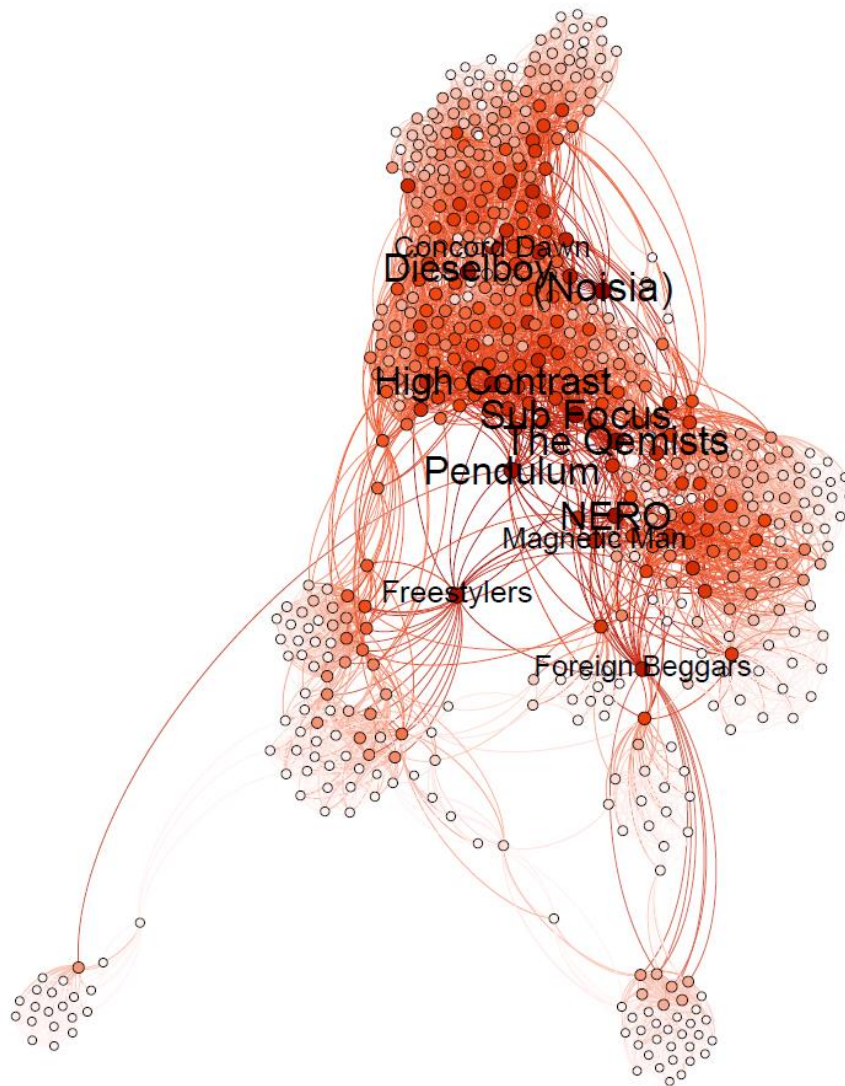
Figure 5: Noisia's Spotify Related Artist Network highlighting the top 10 actors with high-est closeness centrality. The size of the dots (small-large) are according to closeness (low-high).
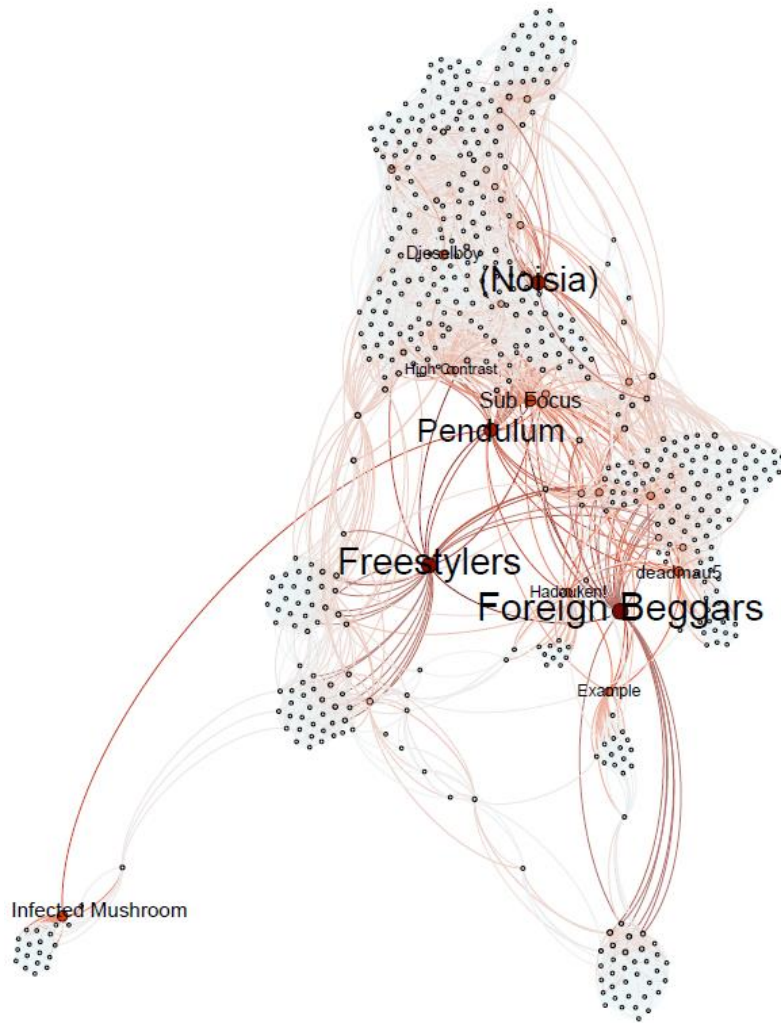
Figure 6: Noisia's Spotify Related Artist Network highlighting the top 10 actors with high-est betweenness centrality. The size of the dots (small-large) according to betweenness (low-high).

The results from the different centrality measurements are far from identical and their usefulness equally varies. That 'being central' can be interpreted in different ways is clearly observed through the different kinds of centrality measures.

6   Network analysis

As argued before, the systems that provide the data play an important part in the outcome: they are socio-technical systems. Being built by humans with a certain idea in mind, they are intermediaries with their own ethics, values and duties. Spotify's Related Artists section, the starting point for the analysis, is therefore already laden with value and meaning in several ways. To make the connection between artists, Spotify constructs an image of the artists through endless data points, created by themselves and by their users. This process gives rise to a certain datafied construction of the artists; it creates a 'data double' (Lupton 2014).[25] Spotify then uses that data double to make their connections and predictions, causing the doubles to have their own social lives and materiality. Secondly, by making the related artists a prominent feature on a profile, Spotify assumes that users would find this interesting information. It may indeed be true that with so many users and so much behavioural information, there is a good chance that the linking of artists in this way *is* meaningful and wanted information yet it only has *a certain* meaning. Listener behaviour determined that the artists in the network are Noisia's related artists in this case. Alternatively, a network of related artists based on musical similarities, such as provided by Pandora Internet Radio does (Prey 2018), is probably just as effective. As Spotify is an important platform for artists to reach their audience and obtain revenue, the way they operate determines the possibilities to a certain extent. If an artist disagrees with the results, there is not much

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[25] Lupton uses this term to refer to datafied constructions made by self-tracking, but the principle of 'a self' constructed by data applies here also. Other terms have been used as well, such as 'data shadow' (Andrejevic 2013) or 'data subject' (Ruppert 2011). I prefer the term 'double' as it highlights, in my perception, the fact that it is often treated as something complete and autonomous, often mistaken for the real thing.

that can be done, but the results will still affect the artists,[26] plainly what Spotify says is important.

The results need to be considered with this in mind. If one examines the clusters in the network (the more densely connected artists), it is evident they coincide roughly with different music genres. The visualisation below (figure 7) reveals the genres that can be associated with the clusters. This shows that Noisia's network is (unsurprisingly) dominated by electronic music, with some space for Rap and HipHop (central/bottom right). Even though Noisia collaborated with and remixed for musicians from the Pop and Metal genres in the Spotify network artists from those genres do not appear at all. In that way the network does not represent Noisia's actual artist network, but their data double's. The network is thus not less real but It is not a conventional social network where the relations are made by the artists themselves, but these artists are truly related in a way that the algorithm linked massive user-data points regarding their music and profile together.

What then, is Noisia's related artists' network? It is the interconnected artists on Spotify presented in a network graph. It is an imposed network, one that came into being not naturally by actual relations but determined by Spotify's algorithms that used data generated by user behaviour; a network of data doubles.[27] Keeping in mind the ambiguous nature of the source, there is a clear reason to take this network seriously. Even though we cannot always know what exactly is in the 'black box'[28] (the technology), we can use its outcomes to gain insight. To some extent, the black box needs to be trusted, because the streaming plat-

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[26] For the related artists section, his can be painfully clear especially for artists that are new to the platform and on whom not much data is yet available. One artist by the name of 'Exodus Music' makes congregational worship music and reported on only having heavy metal bands in their Related Artists section (Spotify Community).

[27] Also, Rieders crawler of the network incorporated certain decisions, such as how big he allows the network to be. With different ranges, the network could be larger or smaller, influencing the results as well.

[28] According to Latour, *"paradoxically, the more science and technology succeed, the more opaque and obscure they become"* (1999, 304). The 'black box' is commonly referred to as those obscured internal workings of systems that are often a mystery to the user, who only focuses on input and/or output.

form has proven its worth by becoming an important platform for musicians and listeners. Nevertheless, there is a need to know *about* the black box, to acknowledge that it might serve purposes beyond the user's (like Spotify's needs). Additionally, there is the mediating role of technology, the possibility that even by providing this information, Spotify could be shaping the way artists relate to each other and what users listen to. The way Spotify implements Related Artists pushes artists to consider the suggested artists as related, and we thereby might treat them that way. Likewise, seeing an actor having a prominent position in the network, will make us approach them in this manner.
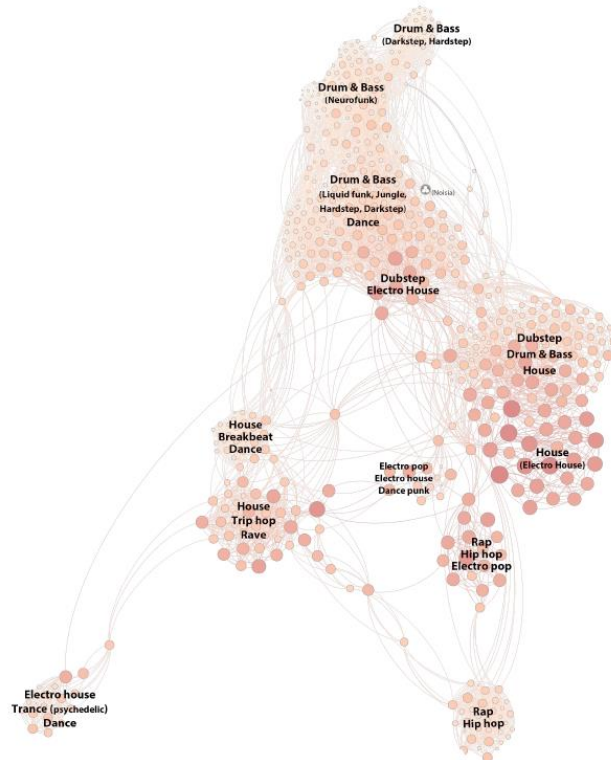

Figure 7: Genre clusters in Noisia's Spotify Artist Network.

6.1 Centrality analysis: degree centrality

By means of centrality analysis, one can examine possibilities and restrictions of actors in the network. Each centrality measure has its own characteristics and will be addressed separately.

Having a high degree means the artist is highly visible on Spotify, which means the artist is often linked with the profiles of other artists. Other possibilities include the artists appearing as a suggestion to the user as something they would be interested in. The actors from this top ten are probably well-known by any one of the actors in this network and their fans. In a way the score reflects the most prestigious or popular artists of Noisia's network. If we compare these names with the first network graph (figure 2), which reflects Spotify's overall popularity, we notice there is a difference. With regard to *all* Spotify's artists, in Noisia's network, the most popular ones appear at the centre-right (the 'House cluster') (see figure 7). It makes sense that the results differ, because drum and bass is a less mainstream sub-genre of Electronic Music than House, which overall has a bigger audience. Even so, when looking at Noisia, the position of important actors in this personal network would be more meaningful to them, as they would be less interested in the 'whole', where they play a relatively marginal role. In their network, the high degree actors such as Gridlok, High Contrast and Logistics, are most likely the important, highly esteemed ones in the genre, more so than for example Tiësto or David Guetta, who are more popular on Spotify.

High degree centrality in Noisia's network gives the artists an advantageous position with regard to connections and information that are interesting for Noisia. Even when we approach the artists as data doubles, this idea still stands. Degree information is valuable for example if one was looking for certain information or to form a collaboration. Artists with a high degree position might be the ones to connect to, as they are the prestigious artists in the network. Another reasons to pursue these artists would be if Noisia would want to release their own information (such as news or a new track) getting support from these other actors would be meaningful as their opinion would likely be held in high regard and therefore influential in their network. A downside is that

because the high degree actors have great access to information and options because of their many connections, it would be harder to influence them since they are less dependent on others because of their position and do not need the influence of others to succeed. Even so, all top central actors are situated close to Noisia's position in this network, in the top clusters, indicating these actors are all closely connected: they are either directly related to Noisia through Spotify, or through one or a few ties. Their structural closeness is visible when we take a closer look: there are for example many 2-distant-paths (a separation of two ties/one actor) between Noisia and Gridlok (the #1 degree actor), meaning there is only one other artists profile separating the two and they share much the same audience and are visible in each other's network. As noted before these high degree actors are probably well known to the audience because of their visible position so to learn that these names hold each other in high esteem might not exactly be news. To know exactly who are given linked in this way by Spotify probably is. It is likely that based on real-life connections, the artists themselves would name very different artists but Spotify's data shows, which artists *users* hold in high regard and find important as made clear by their listening behaviour, all of which could add a deeper insight into the connections Noisia already has and is familiar with.

6.2 Centrality analysis: closeness centrality

The top closeness actors are the ones that have the shortest distance from all others in the network. Their position in this Spotify network means that we can quickly reach these artists through other artists profiles. Since we are dealing with an ego network, starting from Noisia, it is not surprising that Noisia is close to Noisia. It explains the fanning out of high to low closeness actors as well, as the low closeness actors have been rendered only through connections by other profiles, further away from the starting point of Noisia's profile. The names in the rest of the top ten, then, are logically found closely related to Noisia.

Since the network is egocentric, we would expect all the actors high in closeness to be *directly* tied to Noisia, but there are actually two ac-

tors in the top ten who are not: High Contrast and Magnetic Man. By expanding the network two steps beyond Noisia's directly related artists, the centrality of all the actors shifted. When looking at closeness, it gave more weight to some artists outside Noisia's direct ties. In terms of this particular network, it shows some artists 'further away' as having a more closely connected position. Because of this, we could attempt to approach it as if it were a whole network and see what that brings.

Usually, high closeness indicates a high likelihood of the actor for being in close connection to the network actors. An actor with a high closeness position, is never far away from the others in a network and thus would be able to avoid potential control by others for having their own quick access to information or people. A high position would account for more direct influence than others. However, we are not dealing with personal, 'physical' relationships between the artists and this network. The question arises how a high closeness artist in the Spotify Related Artists Network can for example, exercise control over another actor. Control, in this case, is exercised by the data of large amounts of users, unknowingly forming ties by using the platform. Noisia would not be able to cut a tie to refrain another actor from information (in that way 'exercise their power'). Noisia, nor any other central actor, has little, if any, control over the ties. The powerful and efficient tools of short transmission time and direct influence associated with closeness, would only be applicable if this network of Noisia's data double resembles the real artist's network, which would have to be assessed separately. Additionally, the standard deviation is small (table 2), as we see visually reflected in figure 5. The range of high scoring actors is quite large (visible as the many big, (dark)orange dots), and the closeness scores overall show little variance– something closeness suffers from in general (Borgatti et al. 2013: 173). This suggests that to occupy a position with high closeness is not unique, which limits its usefulness.

6.3 Centrality analysis: betweenness centrality

High betweenness actors are the 'bridges' in the network over which information tends to flow. In our network, this means a high between-

ness actor is an artist profile that often appears between two other pro-files. What stands out in these results (figure 5.5), is that beside a few of the actors that are central or important in other terms (for instance hav-ing high degree), we also find actors that in other cases hold relatively marginal positions in the network. This points towards the idea that 'smaller players' can be important bridges. Compared to closeness cen-trality, the difference between higher and lower scoring actors is much bigger: the top ten unquestionably stands out. That Noisia appears high in these lists is again of little surprise, because with the data coming from an egocentric design, by definition all pairs of actors are connected either directly or indirectly via the ego (Marsden 2002: 410). The next top ten betweenness actors will be the interesting ones in this case.

Again, because we deal with data generate by platform user-behaviour, and not the actual social network of the artists, we cannot say the artists themselves have control and influence over connections. With regard to betweenness, the #1, Foreign Beggars, cannot exercise power by for example isolating or preventing contacts on Spotify, as would be the case in a purely human social network. Even though none of the actors can actually control the relations, high positions still ac-count for important actors that can function as bridges on the streaming platform: high betweenness actors appear often between artists pages on Spotify and thus connect their audiences. The bridge-actors in several cases could prove to be valuable ties for reaching out to other genres. If for example Noisia were interested in expanding their audience and genre-horizon, high betweenness could indicate which other artists al-ready in their network, might prove a strategic ally. Based on the results, Foreign Beggars and Example can connect them to an audience of Rap and HipHop, Freestylers to House and Dance music and Infected Mush-room to Psychedelic Trance.

However, since Noisia have been productive for many years, collab-orations with a lot of the artists in their network have in fact already taken place. Noisia has produced music together with certain artists and (as is very common in electronic music) remixed many others. An exten-sive collaboration between Noisia and the rap artists Foreign Beggars for

example even led to the forming of supergroup 'I Am Legion'. Further-more, they already have remixed for half of this betweenness top actors alone. The possibility that these ties and centralities appear in Noisia's Spotify related artists network could well be *because* they worked to-gether in the past, which would reflect the effects of their musical choices. By collaborating with rap artists, they gained an audience that share an interest in both rap and electronic music, which makes them related artists. On the other hand, we do not find any Pop or Metal art-ists here, so Noisia's productions for pop artists (such as Robbie Williams and Katy Perry), or the collaborations with the metal band Korn did not result in bridging those audiences, at least not visibly so on Spotify. At this point, unexplored bridges might prove fruitful connections to new genres and their audiences, or the related artists network could be de-ployed to find artists beyond their network to really explore new audi-ences. For example, artists on the periphery might have little importance within the current network but can be effective in connecting to other networks and hence audiences.

This centrality analysis shows a more in-depth understanding of an artist on one of the most important music streaming platforms by look-ing at the relationships it identifies between musicians. The network shows us what artist group Noisia is perceived to belong to according to the data. As far as Spotify reveals, the related artists are based on user activity, so it tells us something also about audience perception; the artists in the network are the artists that share an audience. The differ-ent kind of central figures in the network can point towards important artists— maybe not a view founded on how the artists see themselves but one based on user behaviour data. If we include considerations about the importance of these actors in the real world, the data can be put to use beyond Spotify's streaming platform.

7   Discussion and conclusion

When it comes to data analysis, there is no shortage of help in accumu-lating numbers and showing timelines. Many services provide such intel-

ligence on their own platform, and services that incorporate the results from several platforms are growing (e.g. SoundCharts, Next Big Sound, Chartmetric). A more fundamental question is the best way to approach data analytics and platforms in general, and other ways of analysing data that provides more insight than plain statistics. A key aspect is that platforms like Spotify are sociotechnical systems, making them function as cultural intermediaries. The digitisation of the music business has been caused by a wider technological advancement, driven by typical network concepts and methods, which led individuals to become more networked as well. For that reason, employing a network perspective to answer to the need of insight beyond statistics is to be recommended. Based on the findings, both theoretical and empirical, there is an answer to the main question of what possibilities network theory can provide music business professionals. That we live in a networked society is no surprise but to realise that networks are not random is less well known.

Networks follow internal rules and patterns that we can study and the theory of networks offers a way of approaching the world by thinking in relations, not in isolated units or groups. We can use it to make sense out of online platforms that themselves use typical network structures and ideas. Using network perspectives and analysis will usually not directly show one how to succeed or predict the future, but its value is beyond that; it provides guidance on where to look for answers (Marin & Wellman 2011: 21). Network theory provides the tools and methods to understand our complex systems of relationships. When the biases that come with datafication are taken into consideration, using network perspective when dealing with data and online platforms can indeed offer more control and power over one's activity.

A case study of Noisia's related artists has shown that caution is needed when we apply network analysis for algorithm provided data. This caution will reveal the biased nature of the data and makes us realise what the numbers *can* reveal. It allows us to bridge unproductive data scepticism and naive faith in numbers. Each investigated centrality measure reflects some important, powerful structural characteristic of the network: degree centrality demonstrated who the prominent actors

in the network are, which can be useful when seeking reach or respect, for example. Closeness centrality highlighted the actors who have the shortest distance from all other actors in the network, but the value of this measurement is not likely to be that useful with so little variety in the results and because this was an egocentric network. Betweenness exposed the actors that fell along the shortest paths, or, the possible bridges of the network. They are not per se prominent actors, but possible connectors between for example audiences or genres. Importantly, we cannot blindly follow the theory behind the centrality measures, to say the centrality measures reveals possible opportunities and restrictions, when it comes to this network. An understanding and critical approach to data and the way it has been mediated by algorithms and platforms, an awareness of the black box as it were, is necessary to reasonably interpret the results. If the network resembled the real-life social network of Noisia, then the power and control possibilities make sense but that is not the case with this algorithm generated network. Investigating this particular network gives insight into the position Spotify places the artists and tells us a lot about how listener behaviour creates a datafied version of Noisia with its own reality and network. Since Spotify plays an increasingly important role in the way audiences discover music, it is valuable to gain insight into how the platform organises, categorises and links artists because that information is vital to potential success. The network analysis in the case study indicates one of those ways, and consequently reveals information on interesting relations Spotify draws for Noisia, both past and future.

8   Limitations and future work

However freely available or easily accessible much network data and tools are, it is to be noted that network theory is a complex area of study. Network analysis demands commitment to the subject and theory for the research to be useful. When proposing anyone to apply a network perspective to gain insight, thorough application and understanding probably demands specialised assistance. With regard to practical

issues, one main limitation lies in the source of the data. Because Spotify is not completely transparent about the way the related artists are constructed, it cannot be completely determined what exactly flows through the ties. The analysis was made on the assumption that the decisive data source is user behaviour, based on reports on Spotify's platform, but how exactly this is assembled could not be verified. This adds uncertainty to the results.

Furthermore, while network perspective has become increasingly important to describe social dynamics in today's information age,[29] the fact remains that our interactions are not only typically, more fragmented, diverse and free than before, they are also more digital which can complicate things. The way we connect, communicate and exchange information indeed can be approached as embedded in networked structures, but the 'classical' constraints, rules and procedures are not always the same. In social network theory, *trust* for example is regarded as the primary currency (Rainie & Wellman 2012: 19). Much of the activity is aimed at gaining and building trust, because trust ensures relationship ties, which are necessary to thrive. But if one looks at a related artists network on Spotify, where does trust fit in when the ties are made or broken?

Trust does not have a place in the process of building relations constructed from big data, accumulated by machines. This fact signals a weakness in Latour's equalizing of all types of actors, human or non-human, in his actor-network-theory. When our socio-technical networks follow different rules to our usual social networks, there must be a difference, and such networks perhaps need another approach. It would be interesting to see how network theory can adapt to these developments.

This research aimed to engage in both qualitative and quantitative practice using methods and tools that go beyond any single approach. At an academic level, the results may add some insight into how to critically

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[29] As described thoroughly in for example Barabási's "Linked" (2002), Castell's "Rise of the Networked Society" (2009) and Rainie & Wellman's "Networked: The New Social Operating System" (2012).

engage with theory and practice. What the research findings offer to music professionals is a concept of how to deal with our datafied surroundings, that have quite suddenly permeated the music industry. By looking at events as a collective effort and seeing that everything is connected, thinking in networked relations can help grasp some meaning amidst the current deluge of information.

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The Music Business and Digital Impacts. Innovations and Disruptions in the Music Industries by Daniel Nordgård
Springer, Music Business Research Series, ISBN 978-3-319-91886-0 (hardback), ISBN 978-3-319-91887-0 (e-book)

Book review by Peter Tschmuck

The multi-talented Daniel Nordgård's resume includes DJing in his Norwegian hometown Kristiansand as well as becoming a director of Norway's largest music festival (Quart) and board membership of several music business associations in Norway. Currently he is first and foremost a well-regarded academic specialising in music business research who began his university career as a PhD student at the University of Agder in Kristiansand/Norway in 2009.

Two years beforehand he was invited by Peter Jenner (former manager of Pink Floyd, The Clash, T Rex and other famous acts) and Bendik Hofseth (renowned Norwegian composer and musician as well as a professor at Agder) to act as secretary to the Kristiansand Round Table Con-

ference (RTC). This was an invite-only meeting of between 30 to 50 international music business professionals that included representatives of various collecting societies, technology firms, lawyers, lobbyists, academic scholars and journalists to discuss developments in the dramatically changing music economy.

Although the RTC talks were recorded they were held using Chatham House Rules, meaning that all statements and arguments that occurred during the RTC could not be directly attributed. The recordings provided an excellent collection of invaluable first-hand information about the music business that grew over the several years the RTC took place. A direct consequence was using this incredible pool of data for a PhD project on developments over time in the digitalized music business. [The Music Business and Digital Impacts](#) is the result of that PhD project, which contextualises its finding within a broad theoretical framework.

Nordgård structures his book into three parts. In the first chapter, he outlines the theoretical framework, defining music recording, music publishing and live music as three different, but inter-related music industries, each with their own logics of production and dissemination. In all three music sectors however, copyright plays a crucial role and copyright issues were a frequently contested area in the RTC discussions. As such findings in the economics of copyright literature are important components of the author's analysis of the sectors' value chains. The most important analytical framework Nordgård employs is the concept of Strategic Action Fields (SAF) by Fligstein & McAdam (2012). A SAF is a social field constituted by individuals who share their values and beliefs to form a collective identity. The individuals become *"skilled strategic actors"* (Fligstein & McAdam 2012: 46) who are able to convince others to pursue a goal by collective actions. A company as well as other institutions can be defined as SAFs. The author argues that the concept of SAFs *"(…) can be used in analysing and making sense of the music industries' digital transitions"* (Nordgård 2018: 20). In the theoretical part of the book, the author highlights change processes, but also continuities

in the music industries by analysing the decline of the recorded music industry and the rise of the live business by the digitization processes.

The core of Nordgård's book is the analysis of the topics discussed in the RTC talks in chapter 2. This reflects the often controversial and ambiguous discussions among the music business representative and outside stakeholders. In the earlier years of the RTC, discussions often revolved around the decline of recorded music sales and accessing music on the Internet, with the main lament being the inability to compete with free (e.g. P2P file sharing). However, with the launch of Spotify in 2008 the discussions shifted to questions on how to monetise music streaming, As well as Spotify, the role and impact of Apple and Google (YouTube) were fiercely debated topics, often with invited representatives from these firms in attendance. Other debates included dealing with "outside" stakeholders such as ISPs & ICTs as well as influencing policymakers and legislation given their increasing relevance in the music business.

Another very relevant topic was the role of record companies, with claims of their obsolescence, contrasting with claims that record labels still played an essential gatekeeping role in A&R development and as owners of vast recorded music catalogues. The discussions also highlighted the music industries' complex structures that result in the dysfunctional exploitation of music rights and inefficiencies in the distribution of revenues. This led to extensive discussions on possible solutions such a Global Repertoire Database (GRD) and an International Music Registry (IMR)

By the end of chapter 2, the author has identified three main concepts (Nordgård 2018: 99-119): (1) The concept of internal dynamics proposing *"(…) that structures and dynamics of the music industries is a determining factor of their adoption of new digital opportunities (…)"* (Nordgård 2018: 100); (2) the concept of external actors' impact on progressions what Fligstein and McAdam refer to a exogenous shocks and (3) the concept of relations to legislation and policymaking to influence the legal framework in the music industries.

In the final part of "The Music Business and Digital Impacts" the author ties together the three concepts via the analytical framework of SAFs to answer the main research question: *"What determines the music industries' processes of adapting to a digital, online era?"* (Nordgård 2018: 121). The main findings are firstly that the music industries themselves are critical in re-organising their structures, processes as well as internal and external relations. Secondly, the disruptive incumbents that caused the "digital crisis" will not replace the established industry players. Thirdly, there is little evidence for a convergence between the external stakeholders such as Apple, Google or Spotify and the three music industries. Therefore, Nordgård proposes alternative approaches to understand the digital changes based on the analytical concept of SAFs.

Nordgård's new book provides an excellent insight into the controversial discourse on the impact of digitization on the music industries. His analysis of the recorded RTC talks helps the reader understand how the industries' various stakeholders perceived the changes and how they reacted to these external challenges. Whilst the focus is limited to the period between 2007 and 2011, the topics remain relevant to subsequent RTC's. Arguably one could contest the notion of three different music industries especially given the evident bias in the book towards the music recording and publishing sectors and little analysis of the changing live music business. Even though the book takes a relativizing view of disruption, it is an inspiring source for a further discussion about what is happening in the digitized music economy – a discussion that will be continued in Springer's Music Business Research book series.

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