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Is There Diversity on Popular Music Radio?

Developing a Methodology for a Quantitative Analysis of Radio Playlists

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Abstract:
Due to product differentiation and targeting policies, radio stations applying the same music format may show distinct differences in their music offerings. This article contributes to the methodology and development of practical measures for the analysis of radio playlists. Drawing from Napoli's (1999) model on the dimensions of diversity, the authors develop indicators that cover four components of musical diversity: origin, ownership, repetition, and epoch of music. To demonstrate the feasibility of these indicators, this article compares the music played by Finland's three leading adult contemporary stations.

Keywords:
Adult contemporary stations, competition, Finland, methodology, popular music, radio broadcasting

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Introduction

During the last half century, broadcast media program variety studies have concentrated on television due to its overwhelming prevalence in everyday life and as a versatile mass medium providing a rich variety of information and entertainment. However, new Internet-based delivery systems, the exponential growth of content supply, and personalized consumption patterns are now calling into question the relevance of television content monitoring. At the same time, broadcast radio has suffered less from the countless new ways of consuming music (e.g., YouTube, Spotify, and iTunes). In many markets, it has managed to keep not only its "share of voice" but also its "share of ear" (Valcke, Picard & Sükösd, 2015: 2), indicating radio's agile adaptability and versatility (Hagen, 2015). Producing radio programming is relatively cheap; radio is available everywhere and accessible through a variety of media, from traditional FM receivers to mobile phones. All prominent radio stations take advantage of new digital platforms and social media (Bonini et al., 2014). As radio continues to evolve and maintain its popularity, it is perhaps time to pay more attention to the diversity of its output.

Because program variety studies have historically focused so extensively on television, their methodology has also been dictated by the characteristics of television. Accordingly, analyses of content diversity have focused on the distribution of programming by genre, which has been measured with various mathematical parameters, such as the Herfindahl-Hirschman index (HHI) and Shannon's relative entropy index (H) (e.g., Dominick & Pearce, 1976; Hellman, 2001; Litman, 1992). Similar methods of scrutiny have also been applied to radio programming (e.g., Ala-Fossi & Haara, 2010; Dimmick & McDonald, 2001), which turned out to be laborious because radio program schedules are seldom structured around separate programs; instead, they are based on a continuous flow of music, presenters' talk, station jingles, advertisements, etc. Radio program flow cannot be analyzed without actually listening to the flow. Recognizing the fact that the radio medium had essentially become a music medium, many studies have focused on radio music formats, using the absolute number of different formats as the measure of content diversity (e.g., Berry & Waldfogel, 2001; Polinsky, 2007; Rogers & Woodbury, 1996). Few studies have ventured to tackle the musical content by comparing the actual playlists of radio stations (e.g., Ahlkvist & Fisher, 2000; Chambers, 2003; Williams, Brown & Alexander, 2002; Hellman & Vilkko, 2017). These analyses often applied measures drawn from research in the recording industry, yet another vital tradition of diversity studies (e.g., Dowd, 2004; Petersen & Berger, 1975).

This article contributes to the development of practical mathematical measures for the analysis of radio music offerings. Following the argument by Chambers (2003: 37), we suggest that, "instead of depending just on counts of the number of different formats," more emphasis should be placed on a "within-format measure of diversity, including the analysis of the actual songs and types of songs." However, focusing on one dimension of musical diversity only, such as the genre or style of individual songs, seldom provides a full picture of the musical variety provided to the listener. To avoid the typical pitfalls of diversity studies, we draw from the model on dimensions of diversity suggested by Philip Napoli (1999) and introduce a set of 12 parallel measures of musical diversity representing two broad dimensions (source diversity and content diversity) and four different components (origin, ownership, repetition, and epoch of music). To demonstrate the feasibility of the suggested multi-measure approach, it is tested in a comparative analysis of the playlists of Finland's three leading adult contemporary (AC) stations.

The structure of the article is as follows: The next section discusses the issue and dimensions of diversity. The third section outlines the main characteristics of the Finnish radio environment. In the fourth section, we present the suggested measures and variables used in the measurement while, in the fifth section, the measures are applied in assessing the playlist diversity of the three radio stations. In the final section, conclusions are drawn, and methodology and results are discussed.

From dimensions of diversity to indicators of musical diversity

Diversity is generally considered to be a fundamental principle underlying the performance evaluation of mass media systems and media policymaking (McQuail, 1992; Napoli, 2001). Accordingly, the principle of diversity is typically included in national broadcasting legislation and in transnational resolutions concerning broadcasting. In recent debates, diversity has generally been connected with the requirements for public service broadcasting, but even in allocating frequencies to private broadcasters, national media regulators usually justify their decisions with references to promoting and securing diversity (Valcke et al., 2015).

However, as much as diversity is respected as a goal, it is often unclear what "diversity" means. To clarify, Napoli (1999) outlined a model describing the ways broadcast diversity has been operationalized by media policymakers. He identified three main dimensions—source, content, and exposure diversity—and several components to each. *Source diversity* has been operationalized as the extent to which the analyzed media system is composed of diverse content providers in terms of, for example, ownership, workforce, or ethnic origin. *Content diversity* refers to the diversity of program formats or program categories available, the diversity of viewpoints expressed, or the demographic representativeness of the contents provided. Finally, *exposure diversity* refers to the extent to which the audience consumes the diverse array of content.

There is a tendency to think that source diversity contributes positively to content diversity, and content diversity in turn increases exposure diversity, although the research evidence is mixed (Napoli, 1999). A research tradition leaning on industrial organization theory suggests that the diversity of products increases as the supply and the number of competitors increase. On the other hand, advocates of critical political economy have presented an opposing theory, which suggests that competition increases the similarity of products. In this research, we lean on an intermediary view, presented by van der Wurff and van Cuilenburg (2001), which states that the relationship between competition and content diversity is not linear; instead, rivalry improves diversity only to a certain extent, and excessive competition leads to imitation between rival programmers.

The intensity of competition depends not only on the rivalry among current competitors but also on other competitive forces such as threat of entry, threat of substitution and bargaining power of suppliers and buyers (Porter, 1985, pp. 5–29). However, with their strategic choices the firms' can improve their competitive position and influence on the intensity of competition. Excessive competition can emerge when many competitors of similar size compete for market shares targeting the same audience segment with similar products. In contrast, competition is moderated if there are only a few companies in the market and they choose to invest in distinctive content and brand identity (van der Wurff & van Cuilenburg, 2001, p. 216–217). We expect that, under moderate competition, competitors prefer product differentiation, avoid imitation, make active choices, and favor certain source and content types (Napoli 2001, p. 130). This means that firms may apply varying competitive strategies in different dimensions of source and content diversity. We also refer to program choice

theory (Spence & Owen, 1977), which suggests that popular program formats and categories tend to be programmed, regardless of market structures, whereas less popular formats and categories may be totally rejected.

Radio broadcasting is typically an oligopolistic industry in which some key players provide an assortment of radio stations representing different music formats and thereby share the market. Although such a format manifests a considerably narrow musical concept, the existence of various formats in a market generates a certain degree of “external pluralism” (McQuail, 1992). Competitive markets usually provide various music formats—such as adult contemporary (AC), current hit radio (CHR), or classical (Berry & Waldfogel, 1999; MacFarland, 1997)—whereas relevant competition takes place primarily within the format or among the stations targeting the same geographical region and audience segment by playing similar kinds of music.

Most of the earlier literature focused on content diversity (analyzed as a function of market structure) or exposure diversity (analyzed as a reflection of audience demand). Typically, the number of radio stations and unique formats is used as a proxy for product diversity. For example, Berry and Waldfogel (2001), measuring variety by the number of programming formats in a market, found that consolidation of the industry reduced the entry of new stations but increased the number of formats available relative to the number of stations. Similarly, combining the data on the number of radio stations and unique formats with their audience figures, Rogers and Woodbury (1996) and Polinsky (2007) found that increases in the number of stations led to increases in format diversity. Moreover, the results indicated that listeners do not treat stations within a format as substitutes but welcome them as an increase in choice. Polinsky also discovered an increasing tendency of format fragmentation, partly explaining “why stations in the same format seem to be differentiated” (2007, p. 141).

Analysis of product differentiation has focused on the actual music played on the radio. For example, Berry and Waldfogel (1999) and Krämer (2009) compared classical music stations by operationalizing variety as the number of composers of the music on the air. A further step towards the actual playlists was taken by Ahlkvist and Fischer (2000), who compared the degree of standardization between US radio stations representing four major music formats: adult contemporary (AC), contemporary hit radio (CHR), country, and album-oriented rock (AOR). An index of standardization was created by a factor analysis of three variables: (1) the number of hit records added to a station’s playlist, (2) the percentage of records added to a station’s playlist that also appeared on the playlists of other stations in the same format, and (3) the number of records on the station’s playlist. The study found that AC and CHR stations were the most standardized, i.e. they had the shortest playlists and tended to play the same records that were charted as hits and were played by other stations within the format too. The study also indicated that, compared to independent stations, group owned stations had considerably higher rates of standardization.

Examining the diversity of the music output of top 50 radio markets in the United States, Chambers (2003) indicated that the number of different radio formats, the number of overall plays, and the number of gold unique titles on the playlists decreased as the ownership concentration increased. Williams, Brown, and Alexander (2002) focused on the top ten songs of the playlists of a large sample of radio stations and used a distance measure of diversity, which indicates the average distance between the stations. Comparing the average number of unique songs, they found that, despite the consolidation of the industry, song diversity remained stable over the research period, and playlists for same format stations

competing in the same local market slightly diverged, suggesting a growing product differentiation.

In Finland, Ala-Fossi and Haara (2010), analyzing one weekday's program offerings, compared the diversity of 49 commercial stations in 20 cities. Categorizing the music played in 15 genres and using Shannon's relative entropy index, they found that the stations, mostly representing fragmented AC and CHR formats, tended to concentrate on only a few music categories, thus showing a low or mid-range level of diversity per station. Comparing one week of playlists for five major stations representing AC or CHR formats, Vilkko (2010) found that public service stations differed radically from their commercial counterparts by providing more unique songs and a broader range of artists, offering more of the latest, still unfamiliar music and more domestic artists than its rivals. Similar observations were made by Hellman and Vilkko (2017), who compared the playlists of Finland's three leading CHR stations.

The overview of the literature suggests that musical diversity is a multi-dimensional concept, requiring a multi-measure approach that covers the various dimensions and components of diversity. Earlier studies also provide adaptable models for determining relevant variables and designing measures for the analysis of broadcast music.

Finland's broadcasting market

Geographically, Finland is a relatively large country (338,000 square kilometers) with a small population (5.5 million), more than one fifth of which lives in the metropolitan Helsinki area. Although Finland has two official languages, with Swedish being spoken by 5.3% of the population, culturally the country is very homogenous. Illustrative of Finland's media system, which is thought to represent a democratic corporatist model (Hallin & Mancini, 2004), radio music formats were introduced quite late; until 1985, the public service broadcaster Yleisradio (Yle), with its broad program provision, had a monopoly over the radio airwaves.

The last three decades of Finland's radio broadcasting industry have been characterized by continuing commercialization and internationalization. A corporate-based, strictly formatted commercial radio quality culture began to take shape during the 1990s. In particular, the playlist procedure was promoted by Radio Nova, the first truly national commercial station launched in 1997, and international players, such as Kiss FM and Radio Energy, which acquired major stations in major cities. In the 2000s, entries of Sanoma Group, Metromedia International, Communicorp Group, and more recently Bauer Media Group further consolidated the industry. To react to increasing competition, Yle introduced, in 1990, three strictly profiled channels: one representing traditional high culture radio, another a popular music-oriented topical affairs channel, and the third a rock-oriented youth station which, in 2003, was turned into a CHR station. (Ala-Fossi, 2005; Hujanen & Ala-Fossi, 2017; Kurkela & Uimonen 2009; Uimonen, 2010)

Despite the intensified competition—coinciding with the entry of new stations, continuing growth of advertising sales, and a slight downturn in radio listening—we assume that, at the time of analysis, rivalry in the Finnish radio industry was still at a moderate level. Instead of local stations, national or semi-national oligopoly networks, owned by few oligopoly players, dominate the market. In 2017, the Yle stations captured 49% of listeners, whereas Bauer Media Group captured 22% and Sanoma Group 18% (Finnpanel, 2018). At the time of analysis, competition was controlled by restricting the entry of stations targeting the same audience market with a similar format. In addition to Yle's six analog networks,[1] there were

[1] Yle also provides a talk radio and two Swedish-speaking stations.

14 commercial networks available, of which five can be regarded as AC stations and two as CHR stations. While the analyzed three stations all represent AC format, they address a different listenership, as will be discussed below, which suggests that instead of face-to-face rivalry they have chosen a product differentiation strategy. In addition, the established status of the public broadcaster, with its abstention from advertising, can be considered a factor that moderates competition (Valcke et al., 2015). Also, the high concentration rate has resulted in a stable structure of the industry, which moderates rivalry (Picard, 1989, pp. 77–79).

In Finland, categorization of music formats is less strict than, for instance, in the United States. This is perhaps because radio stations in small markets tend to slide towards a wider scope of music, which results in overlap among formats (Berry & Waldfogel, 2001; Uimonen, 2011). However, at the time of analysis, radio licenses in Finland were categorized by the target group and the music content, although format categories were not named explicitly (Hellman & Vilkko, 2017).[2]

Following van der Wurff and van Cuilenburg (2001), we claim that the Finnish radio environment, with its moderate competition, encourages broadcasters to develop a competitive advantage by aiming at product differentiation. Stations within a format can survive by addressing slightly different audiences with differing tastes of popular music, allowing them to share the market.

Case study design

Focus on playlists

Despite the importance of exposure diversity, we aim to define relevant components of source and content diversity, as defined by Napoli (1999), to illustrate the variety of radio music. To develop suitable indicators, we agree with Williams et al. (2002, p. 4), who argue that the “ideal method of measuring product diversity would use radio stations’ comprehensive playlists and would measure concentration based on the relationship between the number of unique songs played and the number of total songs played.” In other words, instead of using formats as a proxy for diversity, we prefer to analyze the actual playlists, with "playlist" being defined as all music played by a radio station over the course of one week.

Analyzed stations

This paper focuses on three leading AC stations: Yle Radio Suomi, Radio Nova, and Radio Suomipop. These represent the most popular radio frequencies and together constitute 49% of all radio listening in Finland (Finnpanel, 2018). All three stations target adult or young adult listeners. In terms of style, Radio Nova and Radio Suomipop have been found to play similar kinds of popular music (Ala-Fossi & Haara, 2010). In 2017, the license of Radio Nova required that its music content be “composed of popular music targeted at a broad listenership” (FICORA, 2016), whereas Radio Suomipop was required to play “mainly domestic popular and entertainment music” (FICORA, 2011). Because Yle Radio Suomi focused on both contemporary and nostalgic popular music and soft, melodic, adult-oriented rock (Nevasalmi, 2014), we classify it as also representing the AC format.

Focusing on these three stations is justified by their position as market leaders and rivals to each other. Since 2010, the number of listeners to both Yle Radio Suomi and Radio Nova

[2] This changed in November 2018 when the most recent licensing round abolished all content regulation in radio broadcasting (Ministry of Transport and Communications, 2018).

has slightly decreased, whereas Radio Suomipop has managed to increase its audience. In 2017, Yle Radio Suomi reached 23% of Finns daily and acquired a share of 32% of all radio listening, whereas Radio Suomipop had a reach of 12% and a share of 9%, and Radio Nova a reach and a share of 11% and 8%, respectively. Yle Radio Suomi's main audience group is composed of listeners over 45 years old, whereas the listeners of Radio Nova are mainly between 35 and 54 years old and those of Radio Suomipop between 25 and 44 years old (Finnpanel, 2018; Statistics Finland, 2018), suggesting that despite the common format the stations target their offerings differently.

The three stations represent the three biggest actors in the Finnish radio industry. Yle Radio Suomi, launched in 1990, is part of the state-owned Yleisradio Oy and a nationwide network which, on weekdays, also provides regional programming. Radio Nova, entering the market in 1997, was originally controlled by commercial television broadcaster MTV Media, which, since 2007, has been part of the Swedish Bonnier Group. In 2015, Radio Nova was acquired by the German Bauer Media Group, which owns radio stations in more than 20 countries and which in Finland controls several AC, CHR, and rock-oriented stations. Finally, Radio Suomipop was launched by Metromedia International Group in 2001. In 2012, the majority of Metromedia Finland was sold to Nelonen Media, a business unit of Sanoma Group, Finland's largest media corporation, which in addition to newspapers, magazines, and TV channels controls several radio networks (Hujanen & Ala-Fossi, 2017; Finnpanel, 2018).

Data

The data analysis is based on a corpus drawn from two cross-sections, one from 2013 and the other from 2017, both consisting of the playlists from two separate weeks (week 10 in March and week 36 in September), a sample large enough to represent the music output of each station (Hellman & Vilkko, 2017). The sample was compiled from the stations' music reports run by Gramex, the copyright organization for performing artists in Finland, which provides a reliable source of information about the music on the air (Hellman & Vilkko, 2017).[3] The data was provided in the form of Excel spreadsheets, organized station-by-station, week-by-week and covering the following variables: title of each unique performance, artist, record label, parent company, country of origin, year of publication, and number of radio plays during the week. Since record company information was often missing the researchers supplemented the data manually using record company websites and music videos published on YouTube. Following the mission to focus on the actual songs played by the stations, the unit of analysis was a single performance (i.e., a song performed by any artist). Average weekly figures were used as a proxy for the annual output.

The years 2013 and 2017 were chosen for practical reasons of data availability because 2013 was the first full year covered by the new Gramex database compatible with current music reports. One cross-section would have served the methodological purposes of this study, but two years were chosen because the increasing intermedia competition may have affected the music programming patterns of the analyzed stations.

The corpus included a total of 22,398 radio plays of music. From 2013 through 2017, the overall provision of music per week increased by 11%, indicating that music as a programming feature grew in importance. The biggest increase, 28%, is shown by Yle Radio Suomi, which is partly a result of moving live sports broadcasts gradually to the company's

[3] We are grateful to Yleisradio, Bauer Media and Nelonen Media for the permission to utilize their music reports for research purposes, and Distribution Manager Kari Niemelä at Gramex for providing and guiding us with the data.

talk radio station. Although all three stations focus heavily on music, Yle Radio Suomi (1,556 spins per week) played, in 2017, significantly less music than Radio Nova (2,007 spins per week) and Radio Suomipop (2,414 spins per week).

Components and measures of musical diversity

The suggested multi-measure methodology covers two dimensions and four components of musical diversity. Drawing from the model of Napoli (1999), we use the origin and ownership of music played as central carriers of source diversity, whereas repetition and epoch of music represent content diversity.

The term *origin of music* is used in this context to indicate the country where the performance (record) was published. In Europe, there is a long tradition of preserving national identity, which in many countries has resulted in regulation to foster domestic content in broadcasting. In Finland, the share of domestic music, usually performed in the native language, is of great interest for the analysis of radio playlists, although Finland has set no quotas on music played on the radio (Syrjälä, 2010. In general, there is a "home bias" in the consumption of music by Finns, with a strong tradition of *iskelmä* (Schlager), a national popular music style, and *Suomi-rock*, a Finnish-language, melodic rock music style. However, listeners appear to be divided in this dimension, with urban audiences preferring international music trends more than rural audiences (Purhonen et al., 2009). Because one of the stations, Radio Suomipop, is dedicated exclusively to Finnish music, we expect that its main commercial rival, Radio Nova, will differentiate from it by preferring foreign music, whereas Yle Radio Suomi's status as a public service station, obliged by the law to "develop and preserve domestic culture" (Parliament, 1993: § 7), suggests that it provides a considerable share of domestic music styles. However, the breadth of domestic content also requires analysis. Based on earlier research, we expect the commercial Radio Nova and Radio Suomipop to provide a narrower repertoire of domestic songs than the public service Yle Radio Suomi (Hellman & Vilkko, 2017). The origin of music is measured using the following indicators:

1.1 Share of domestic music out of total plays (in terms of % of airtime)
1.2 Number of domestic artists
1.3 Number of unique domestic songs

Another component reflecting source diversity is the *ownership of music*, which refers to the parent record companies that own the rights to the music played on the radio. The radio industry has always been in close cooperation with the record industry, and radio plays are of vital importance to record sales (Negus, 1992; Wickström, 2013). As a result of industry consolidation, the recorded music business today is firmly in the hands of three transnational companies: Sony, Universal, and Warner, labeled as the "Big Three," which control through their local affiliates and distribution chains 70 to 80% of the world market (MIDiA, 2017). In Finland, their market share in 2016 was 92%, and they also control the back catalogues of the most important domestic labels (Gronow & Kaitajärvi-Tiekso, 2017). In addition to major labels, the music industry includes numerous independent or semi-independent labels, resulting in "complex and confusing, continually shifting corporate constellations which are difficult to plot" (Negus, 1992, p. 18). Despite the fact that radio may have lost part of its marketing power in the music business, it still plays a crucial role in the introduction of new releases and in the continuing popularity of the past decades' hits. We expect radio stations to show differences in their relationship with the record companies, with Yle Radio Suomi displaying a lower dependence on the Big Three labels than its commercial competitors. The ownership of music is measured using the following parameters:

2.1 Share of Big Three music out of total plays (in terms of % of airtime)
2.2 Share of Big Three music out of total domestic plays (in terms of % of airtime)

Repetition of music refers to the breadth of the station playlists, which represents content diversity. Earlier research has found that radio stations construct their playlists using differing numbers of unique songs and artists, resulting in more or less repetition (Ahlkvist & Fischer, 2000; Chambers, 2003; Hellman & Vilkko, 2017). In the analysis of the recording industry, the number of performing acts (i.e., musicians or vocalists who have signed recording contracts with recording companies) has been used as a central indicator of diversity (Dowd, 2004). Based on earlier findings (Berry & Waldfogel, 1999; Hellman & Vilkko, 2017; Krämer, 2009), we expect commercial stations, being more responsive to anticipating listener acceptance, to provide a narrower playlist with fewer songs and artists than the public service station. At Yle Radio Suomi, this should also result in a lower degree of repetition of songs during a week and in more songs being played only once during a week than on commercial stations. The repetition of music is measured using the following measures:

3.1 Number of unique songs on the playlist
3.2 Number of artists on the playlist
3.3 Average number of plays per song
3.4 Share of unique songs played only once during a week (%)

Finally, the *epoch of music*, also indicating content diversity, refers to the year of release of the recordings played on the radio. Playing a latest release is always a risk for a radio station because its popularity in the target group is not yet known, and the risk is even greater if the artist is not yet established. For this reason, commercial stations use auditions to select the music on their playlists. Depending on the station format and target audience, both the newest releases and established hits are given a certain share of the airtime. Earlier research has shown that public service stations are more open to new releases that are not yet hits than commercial stations, which rely more on familiar popular songs (Hellman & Vilkko, 2017; Hendy, 2000). However, AC stations may perform differently depending on their core target group. Among the three stations under scrutiny, Radio Suomipop targets the youngest listeners, which we expect to translate into the newest musical profile, focusing on music released during the new millennium. Yle Radio Suomi, in turn, addresses the eldest listenership, which we expect to result in a musical output skewed towards nostalgic and gold titles, whereas Radio Nova should be placed somewhere between the two. We also wish to analyze how evenly the music played distributes across the decades. For this purpose, we categorize music on the playlists into six categories: (A) music released during the year of analysis (2013 or 2017), (B) music released between 2010 and 2012/2016 (depending on the year of analysis), (C) music released between 2000 and 2009, (D) music released from 1990 to 1999, (E) music released from 1980 to 1989, and (F) music released before 1980. Based on the broad listenership and general interest status of Yle Radio Suomi, which provides dozens of special programs on music weekly and is not restrained by strict playlists, we expect it to display the widest variety of musical epochs. The epoch of music is measured by focusing on the following indicators:

4.1 Share of category A music out of total plays (in terms of % of airtime)
4.2 Share of category F music out of total plays (in terms of % of airtime)

4.3 Relative entropy of the distribution of epoch categories of total plays (Shannon's H, calculated from percentages of total airtime)[4]

Although genre (or style) is one of the main measures of musical diversity, it is not utilized here as a variable. As Lena explains, genres are "systems of orientations, expectations and conventions that bind together industry, performers, critics, and fans in making what they identify as a distinctive sort of music" (2012, p. 6). Thus, genre refers to a consensus about distinctions between styles. However, we find genres too broad and blurred for the criteria of genre to be used to distinguish among radio stations. There are two reasons for this: First, as Uimonen points out, the stations themselves "dilute genre boundaries and shape them to make them fit their operative culture" (2011, p. 209). For example, an AC station can stretch the boundaries of popular music to include gold rock songs and the latest dance music, thus serving as a melting pot of various musical styles. Second, music genres are dynamic and epoch dependent, with interpretations of genre developing over time, which makes genre classification across decades a challenge (Schmutz, 2016). In other words, what was considered rock music in the 1970s may have become pop music in the ears of today's listener. For these reasons, genre is not utilized here as a component of diversity.

Song-by-song comparisons—using country of origin, record company, year of publication, and the extent of repetition as variables—give an unambiguous basis for scrutiny and provide an adequate basis for indicating differences among stations. By applying a multi-measure approach in the analysis of differences between the stations, we wish to provide a comprehensive picture of the characteristics of the playlists.

Results of the Finnish case study

The quantitative results of the analysis for each component are compiled in Table 1 below.

Origin of music

The more airtime domestically published music gets, repetition included, and the more unique domestic artists and songs are presented on the playlists, the more domestic the programming. Measures of domestic content show distinct differences between the three stations. The offerings of Radio Suomipop indicate that a radio station in Finland can base its business model solely on domestic music, whereas the humble and dramatically decreased share of domestic music at Radio Nova suggests that providing an international alternative translates into product differentiation. The slight dominance of domestic music at Yle Radio Suomi, then, suggests that national content is reasonably important for the public service radio strategy. More importantly, Yle Radio Suomi distinguished itself from its competitors by increasing moderately its domestic choice and presenting, in 2017, four times as many domestic artists as Radio Suomipop and six times as many as Radio Nova, as well as almost three times as many unique domestic songs as Radio Suomipop and six times as many as Radio Nova.

[4] Shannon's H, or the relative entropy index, expresses how varied and balanced the music output is on a station. H varies between 0 and 1, with 0 expressing minimum diversity (all content in one category) and 1 expressing maximum diversity (all categories equally large). The measure is commonly used in the analysis of program type diversity on television (e.g., Hellman, 2001; Ishikawa et al., 1996), but it has also been used in the analysis of musical genre diversity on radio (Ala-Fossi & Haara, 2010).

Table 1. Playlist diversity on Yle Radio Suomi, Radio Nova and Radio Suomipop

Measures of diversity	***Yle Radio Suomi***		***Radio Nova***		***Radio Suomipop***	
	2013	***2017***	***2013***	***2017***	***2013***	***2017***
1 Measures of domestic content of music						
1.1 Domestic content of total plays (%)	54.8	56.7	40.4	14.3	100.0	100.0
1.2 Number of domestic artists	354	399	85	64	99	97
1.3 Number of unique domestic songs	528	692	181	112	359	266
2 Measures of ownership of music						
2.1 Share of Big Three of total plays (%)	64.6	73.7	80.6	89.5	88.7	82.0
2.2 Share of Big Three of domestic plays (%)	60.3	71.6	70.3	87.3	88.7	82.0
3 Measures of repetition of music						
3.1 Number of unique songs	985	1 244	653	673	359	266
3.2 Number of artists	744	882	373	405	100	97
3.3 Average number of plays per song	1.2	1.2	2.9	3.0	5.8	8.5
3.4 Share of songs played only once (%)	84.1	81.1	48.9	34.3	12.4	10.5
4 Measures of epoch of music						
4.1 Share of category A of total plays (%)	15.6	12.5	15.7	5.4	29.0	24.9
4.2 Share of category F of total plays (%)	28.7	25.4	3.8	3.5	2.7	0.2
4.3 Relative entropy of epoch categories (H)	.97	.95	.87	.76	.87	.77

Ownership of music

Because the music played on the air is almost entirely composed of recorded music, we assumed that the hierarchies of the music industry should reflect the patterns of music played by radio stations. In 2017, the combined share of the three transnational majors turned out to be 82% of the airtime for music, a slight increase since 2013, but the analyzed stations utilized the music owned by the Big Three differently. Their share was highest on Radio Nova, showing a significant increase since 2013, whereas on Radio Suomipop, their domination was less dramatic, with a remarkable decrease since 2013. This indicates that in addressing the domestic music audience, the station also traces music from independent labels. As expected, Yle Radio Suomi was the station least dependent on the major labels, although it had increased their share in its programming significantly since 2013. The same pattern was found upon examination of domestic plays alone. About 80% of domestic music played by the three most popular radio stations in Finland is owned by the Big Three companies. Interestingly, both Yle Radio Suomi and Radio Nova had dramatically increased the share of major labels in their domestic content.

Repetition of music

The more songs and artists a radio station offers, the less it repeats the same songs, and the more songs it plays only once over the course of a week, the less repetitive (or more diverse) its offerings. In particular, the measures of repetition differentiated the stations conspicuously. In 2017, Yle Radio Suomi played twice as many unique songs and artists as Radio Nova and four times as many artists and nine times as many unique songs as Radio Suomipop. On Yle Radio Suomi, an increase by a quarter in the number of unique songs compared to 2013 is dramatic, as is a drop by one third on Radio Suomipop. The notion of minimal repetition at Yle Radio Suomi is confirmed by the fact that the songs it aired played 1.2 times on average, whereas Radio Nova played each song 3.0 times and Radio Suomipop not less than 7.0 times during a week. Over 80% of the songs that Yle Radio Suomi aired during a week were played only once, whereas on Radio Suomipop, the percentage was around ten.

Epoch of music

The use of music representing different epochs reveals the target group of a station. Because different listener generations are expected to like popular music from different epochs, we assumed that the newest music would be highlighted at Radio Suomipop, whereas Yle Radio Suomi was expected to provide the most varied selection of music from different decades. Although all three stations diminished their offerings of the newest music (category A) from 2013 to 2017, Radio Suomipop clearly gave it more airtime than others (roughly one fourth of the total airtime), whereas Yle Radio Suomi clearly gave more airtime than the others (roughly one fourth) to music released before 1980 (category F). As expected, the music played by Yle Radio Suomi was more evenly divided across different epoch categories than on the commercial stations, with the relative entropy index figures for Radio Suomi referring to a very high level of diversity, whereas the index figures for the commercial players in 2017 were only at a moderate level and clearly in decline since 2013.

Discussion and evaluation of the measures used

This article has contributed to the measurement of the diversity of radio playlists. First, drawing from Napoli's analysis (1999), we argued that musical diversity is a multidimensional concept requiring a multi-measure methodology, or indicators that cover various dimensions and components of diversity. Second, we argued that despite applying the same format, radio stations address slightly different target groups, resulting in product differentiation in their playlists. Third, we suggested that analysis of the playlists should focus on the actual music played, with the unit of analysis being an individual performance by any artist. Finally, this article proposed relevant variables and practical mathematical indicators (representing source and content diversity) that can be applied in the analysis of radio music.

To demonstrate the feasibility of measures, we empirically analyzed the playlists of three leading AC stations in Finland. The chosen stations—Yle Radio Suomi, Radio Nova, and Radio Suomipop—represented both public service and commercial organizations in addition to representing the flagships of the three biggest firms in the Finnish radio industry. Despite increased competition within the format, the analysis showed that the stations' playlists differed distinctly in terms of their origin and ownership (representing source diversity) and degree of repetition and epoch of music (representing content diversity).

Whereas Radio Suomipop displayed the highest degree of domestic content, it, like Radio Nova, leaned on a relatively narrow choice of domestic artists and songs, whereas Yle Radio

Suomi provided a significantly broader domestic repertoire. Although all stations were dependent on the Big Three record corporations, Yle Radio Suomi clearly provided more music from independent labels than its commercial rivals. Whereas the degree of repetition on Radio Suomipop was very high, with an average of seven spins per week for each unique song, Radio Nova and, in particular, Yle Radio Suomi played significantly more solitary performances, thus showing less repetition. Finally, whereas Radio Suomipop concentrated on music released in the 2000s and Radio Nova on music from the 1980s and 1990s, Yle Radio Suomi provided a broad variety of music from different decades, including “oldies." In conclusion, popular music radio stations, often regarded as duplicates to each other, provide and contribute to musical diversity through product differentiation.

This study suggests that in Finland, where the radio industry, at the time of analysis, was strongly dominated by a few oligopoly players, even competing stations with a seemingly shared format tended to avoid face-to-face rivalry by adjusting their playlists according to their targeting priorities. The resulting product differentiation among the analyzed AC stations can be explained by market characteristics, such as the small size of the business, entry barriers set by policymakers, and Yle Radio Suomi’s market leadership. This climate favored modest competition within format and forced the leading private stations to profile their playlists differently. However, the recent liberalization of radio content regulation may intensify competition between the stations and result in decreasing diversity.

The study confirms that a format is no more than a very general framework for radio stations. A common format does not mean that the stations are duplicates of, or substitutes to, each other. Rather, format fragmentation and within-format differences represent an industry practice (Chambers, 2003; Hellman & Vilkko, 2017). The results also support earlier literature claiming that adult contemporary stations show both considerable flexibility and fragmentation, which expand their listenership and may also explain their dominance in the market (Berry & Waldfogel, 2001; Polinsky, 2007). Perhaps flexibility was best indicated by the epoch of music played, ranging from the American evergreens of the 1940’s on Yle Radio Suomi to the latest domestic pop hits on Radio Suomipop.

The results of this study lend strong support to the chosen multi-measure methodology. First, the variables and indicators covered two different dimensions of diversity, each distributed into two components. Second, each of these components was analyzed using from two to four indicators, emphasizing the fact that the shifts in the different components may not necessarily be unilinear but partly conflicting. Using several complementary measures facilitates the interpretation of the results and the drawing of firmer conclusions. As to limitations, some of the variables, such as the origin of music, are not necessarily relevant in culturally dominant markets such as the United States. Obviously, the measures need adjusting when applied to different cultural and market contexts. The case of Finland, however, is comparable—and the measures applicable—to other non-English speaking West European countries, characterized by rivalry between strong public and private broadcasters and continuous balancing between their deep-rooted national music cultures and international influences.

Most of the measures applied here allow a per convention statistical testing of the differences between the stations and over time. However, we have refrained from showing calculations because it was not our primary interest to convince the reader of the statistical significance of the results. The fact that the differences between the analyzed stations and, to a lesser degree, over time are so distinct serves as a further evidence for the feasibility of the chosen measures.

Further information about the source diversity of playlists could have been furnished by categorizing the songs on the playlists by the gender of performers, pointing to possible gender-based differences in the stations' targeting policies. In addition, although we rejected genre as a variable of content diversity here, future studies can hopefully make use of stylistic analysis, adapting it either qualitatively (which requires listening to the music played) to a narrow data set (cf., Lena, 2012), or quantitatively by drawing from public repositories of music metadata (such as MusicBrainz and Acoustic Brainz)[5] accessible over the Internet and measuring quantitative audio features by using data-mining tools (cf., Interiano et al., 2018).

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[5] See, https://musicbrainz.org/ and https://acousticbrainz.org/datasets/accuracy.

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