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MUSICAL DIVERSITY AND THE

U.S. MAINSTREAM RECORDING MARKET, 1955 - 1990

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Abstract

What factors shape the diversity of media products? A literature on the recording industry offers competing accounts. The “cyclical account” stresses the negative impact of market concentration, where high concentration dampens the diversity of recordings. The “open system account” stresses the conditional impact of concentration: when centralized production prevails, high concentration dampens diversity; when decentralized production prevails, high concentration and diversity can co-occur. The present paper extends this literature in several ways. First, drawing on quantitative analysis of musical content, it examines the impact of concentration on the musical diversity of hit records. Second, it tests the strength of both accounts by considering a time period where concentration rose and decentralized production prevailed. Finally, it augments both accounts by considering other factors that could likewise affect musical diversity. The results offer strong support for the open system account. From 1955 to 1990, under decentralized production, concentration and musical diversity both increased. The results also expand the open system account. Autonomous performers were most likely to create musically diverse recordings; songs with extended instrumental passages and songs of long duration likewise fostered musical diversity.
INTRODUCTION

Howard Becker (1992) once observed an irony in the sociology of music: most studies have little or nothing to say about musical content. Studies of musical production often investigate the obstacles and opportunities that musicians face. These studies portray music as the activity of individuals, but they rarely examine the musical substance of such activity (e.g., Abbott & Hrycak 1990; Almendinger & Hackman 1995). Studies of musical consumption often examine how social groups use music to signal status or identity. These studies portray music as comprised of various genres, but they seldom detail the musical characteristics that delineate such genres (e.g., Aschaffenburg & Maas 1997; Bryson 1996). To be sure, studies of production and consumption have greatly advanced the sociology of music. However, their relative inattention to content is striking, and such inattention stands in stark contrast to trends found in cultural sociology (see Mohr 1998; Wuthnow & Witten 1988). Sociological studies of literature, for example, have shown that content analysis sheds new light on issues of production and consumption (Corse & Griffin 1997; Griswold 1981).

In the present paper, I demonstrate that the analysis of musical content is important and that it enriches both the sociology of music and cultural sociology. I do so by drawing on an influential literature that is surprisingly silent on the topic of musical content. This literature links the diversity of popular music to the market in which it is produced (Peterson 1994). Its contributors have argued that diversity is shaped by "market concentration" -- the extent to which a few recording firms dominate the market. Given this focus, it would seem that this literature would abound with analyses of musical content. However, its contributors mostly have used non-musical measures to assess the diversity of popular music. For example, they have measured "diversity" by counting the number of new performers and the number of small record firms; high numbers for either measure purportedly denote diversity in popular music.

By heeding musical content, the present study augments the literature on diversity in popular music (hereafter called the "market-diversity literature"). On the one hand, it corrects the literature's
tendency of treating “diversity” as a singular concept, where multiple measures are comparable and interchangeable. I suggest that the multiple measures of past studies may indicate various types of diversity. The numbers of new performers and small record firms, for instance, more likely indicate producer diversity than musical diversity. In fact, I find that the recordings of small firms and new performers are not more musically diverse than the recordings of large firms and established performers. On the other hand, this study augments the market-diversity literature by adjudicating between its competing accounts. Proponents of one account argue that high concentration dampens diversity (Peterson & Berger 1975). Proponents of another account argue that production factors condition the impact of concentration: when centralized production prevails, diversity suffers under high concentration; when decentralized production prevails, diversity can flourish under high concentration (Lopes 1992). I find that decentralized production has prevailed since 1955 and, in turn, musical diversity has thrived in the midst of increasing concentration. This finding resonates with research on other media markets, which also show that production factors can promote content diversity and/or mitigate the negative impact of concentration (Hellman & Soramaki 1985; Hillve et al. 1997; Kaestle 1991; Long 1992; Simonet 1987).

By heeding musical content, the present study also speaks to prominent themes in cultural sociology. First, cultural sociologists have advanced content analysis by heeding both external (e.g., production) and internal factors -- where the latter refer to attributes of the media products themselves (Griswold 1981; Rosenbium 1978). I join their efforts by demonstrating that song attributes have an independent impact on content. Songs with relatively long duration and songs with extended instrumental passages exhibit heightened musical diversity. Second, cultural sociologists have demonstrated that opportunities accrue to established creators (Bielby & Bielby 1999; Faulkner & Anderson 1987). I show the impact of such opportunities. Performers who preside over the recording process (e.g., act as producer) create more musical diversity than performers who lack such autonomy. Finally, cultural sociologists have called for rigorous measurement of cultural constructs (e.g., ideologies), so that we may better understand how such constructs are embedded in the larger social environment (Jepperson &
Swidler 1994; Wuthnow 1987). I heed their call and develop such a measure for musical diversity. It
details the degree to which songs, in a given period, are musically dissimilar from each other. That is, I
compare how songs simultaneously differ along a number of musical elements -- including melodic,
ritmic, and chordal elements. High levels of musical dissimilarity thus denote much diversity, whereas
low levels of musical dissimilarity denote the opposite.²

Like previous studies, the present study addresses a particular market rather than the entire
recording industry (see Peterson & Berger 1975). The “mainstream” is the oldest and largest market in the
US recording industry.³ In the late 1800s, it was the sole market for commercial recordings in the US. Its
early recordings encompassed a disparate range of music styles — including martial, operatic, and dance
music. This “grab bag” of styles eventually gave way in the early 1900s, as the songs of Tin Pan Alley
(e.g., Irving Berlin, George Gershwin, and other New York writers and publishers) formed the dominant
mainstream style for decades to come (Brooks 1978; Gellatt 1977; Sanjek & Sanjek 1991; Wilder 1972).
The mainstream was joined by two additional markets in the 1920s: the “race” market (later called
“rhythm & blues”) that supplied recordings for a mostly African-American audience and the “hillbilly”
market (later called “country”) that supplied recordings for a mostly rural, white audience (Peterson 1997;
Titon 1994). Due to differences in market sizes and audiences, industry personnel cast the mainstream as
a “general” market, while they cast the other two markets as “specialized.” By the 1940s, the three
markets were formalized to the extent that each entailed specific retail and broadcasting organizations.
Thus, the mainstream remained distinct from the specialized markets in terms of its musical products,
business arrangements, and audiences (Ennis 1992; Ryan 1985).

The mainstream market experienced major changes from 1955 onward, of which I mention two.
First, the stylistic dominance of Tin Pan Alley gave way to rock’n’roll around 1955. The detailed
compositions and elaborate arrangements of an earlier era were replaced by rudimentary songs and
stripped-down performances of a new era. Nevertheless, these early rock’n’roll hits were followed by
more elaborate songs in subsequent decades. That is, the range of musical elements in mainstream songs
apparently expanded after 1955 (Hamm 1979, 1981). Second, the mainstream market was situated amidst a growing number of specialized markets. Successful recordings in these specialized markets – such as rap music – sometimes spilled over to the mainstream market (Anand & Peterson 1997; Ennis 1992). When this occurred, the range of musical elements found in mainstream recordings likely expanded. Both developments suggest that musical diversity increased from 1955 onward. If this was indeed the case, what factors accounted for such heightened diversity? The market-diversity literature speaks to this question.

THE MARKET-DIVERSITY LITERATURE ON POPULAR MUSIC

The market-diversity literature contains two accounts. Proponents of the “cyclical” account have stressed the negative impact of market concentration on diversity. Proponents of the “open system” account have stressed the changing impact of concentration; in a past era, diversity suffered under high concentration, while in the present era, diversity could flourish amidst high concentration (see below). Despite their divergent predictions, proponents of both accounts have drawn inspiration from similar sources. Their concern with diversity harkens back to the mass culture critique that was prominent at mid-century (DiMaggio 1977; Lopes 1992). Their emphasis on the causal impact of concentration owes much to industrial organization economics (Peterson & Berger 1975, 1996). I discuss these intellectual roots so as to highlight the assumptions of the market-diversity literature while grounding it in an intellectual history.

Intellectual Roots

Mass culture critique. The mass culture critique of the mid-1900s addressed life under advanced capitalism (Jowett 1992). Its proponents -- who represented a variety of disciplines and theories -- focused on the industrial complex that mass-produced such cultural objects as books and music. They argued that this emergent complex posed several threats to cultural life. First, it usurped the communal context for the production of cultural objects, replacing individual creators with corporate enterprises. Second, it made profit-motive the central, rather than peripheral, goal in the production of cultural objects. Finally, the
"mass culture" of this complex would eventually displace the folk and high cultures that flourished before industrialization (Horkheimer & Adorno 1944; Macdonald 1962; Mills 1951; Rosenberg 1957; van den Haag 1957).

Mass culture critics made dire forecasts about the content and consequences of media products. They predicted that media products will grow less diverse as producers increase their reliance on those genres and formulae that consistently generate profits. Concurrently, producers attempt to make each media product appear unique by adding superfluous changes. This declining diversity, they argued, engenders a passive acceptance of the familiar by consumers, while the "pseudo-innovation" of producers obscures the homogeneity of these objects (Adorno 1941; Greenberg 1957; van den Haag 1957). Thus, standardized media products blind the masses to their existence and reinforce the status quo (Horkheimer & Adorno 1944; Mills 1951; Rosenberg 1957; van den Haag 1957).

Contributors to the market-diversity literature built on the mass culture critique by accepting some of its claims while modifying others. They accepted that diversity plays out in a temporal fashion. They likewise accepted that diversity is shaped by the profit-motives of media firms and by consumer demands. However, they argued that the power of media firms can suddenly wane and that the unmet demands of consumers can lead to disinterest (see Peterson & Berger 1975). Given this modification, these contributors shifted the focus from the societal-level interplay between capitalism and culture to the "market structure and organizational environments of specific [media] industries" (DiMaggio 1977, 448). This shift had important implications. First, they attributed the degree of diversity to individual media markets rather than to a hegemonic media complex writ large. Second, they expected that diversity will not steadily decline but will wax and wane as a given market changes. Their emphasis on the "market" derived from an economics literature.

**Industrial organization economics.** Industrial organization (IO) economists have long examined how market factors affect the quality and range of products. Many have approached this issue by focusing on the relationship between firm size and innovation (Cohen & Levin 1989). Schumpeter (1942) provided
an important touchstone; he argued that the large firms which dominate a given market are more innovative than their small competitors. Due to their size and dominance, for example, such firms have the capacities to pursue extensive research and to absorb costs associated with development. While research on Schumpeter’s hypothesis has produced mixed results (Cohen & Levin 1989; Soete 1979), many subsequently disagreed with Schumpeter. They emphasized that the nature of “bigness” -- which includes extensive bureaucracy, decision by committee, and corporate conservatism -- leads to inertia more than innovation (Adams & Brock 1986). As a result, they argued that large firms typically constrain rather than promote innovation, especially when the status quo favors their situation. Instead, small firms (which are often “new” firms, as well) are the likely innovators. Such firms lack, for instance, the extensive bureaucracy that hampers large firms. Moreover, their peripheral market position can prompt risk-taking and experimentation, in hopes of improving their position (Greer 1992; Scherer & Ross 1990).

The relationship between firm size and innovation has implications for the market. If large firms tend toward inertia, then the quality and range of products (i.e., diversity) suffer when they dominate a market (i.e., when concentration is high; Bain & Qualls 1987; Greer 1992). However, diversity should thrive as the dominance of large firms fades, for this drop in concentration likely creates space for small firms to transform their market (Adams & Brock 1991; Scherer & Ross 1990).

Contributors to the market-diversity literature seized on ideas from IO economics. They have approached market concentration via a consideration of large and small firms. Indeed, these contributors have emphasized two types of record firms: “majors” and “independents.” Majors are large firms that dominate the recording market’s output and earnings. Each major can easily manufacture recordings and rapidly distribute them to domestic and international locales. Independents are relatively small. They have the resources to produce recordings, but they often lack the resources to manufacture numerous copies or to distribute them to domestic locales (King 1966; Vatan 1995). These contributors have portrayed independents as the innovators that drive market change. Nevertheless, they have diverged in their assessments regarding how independents drive market change. Cyclical proponents claimed that diversity
flourishes as independents puncture the market dominance of majors. Open system proponents have claimed that, in recent years, diversity thrives as independents have provided the majors with a model of how to operate and have provided the majors with contractual partners. I now turn to their respective predictions.

The Cyclical Account

*Origins.* The cyclical account sprang from the seminal work of Peterson & Berger (1972, 1975). They explicitly drew on the above economic research and argued that the diversity of popular music declines as fewer firms dominate the market. They first noted that the extent of such dominance has varied over the years. Peterson and Berger then compared annual levels of concentration to multiple measures of diversity. To compile these measures, they counted annual numbers of (1) hit recordings, (2) new performers, (3) independents, and (4) lyrical themes. They suggested that an increase in such annual numbers represents an increase in diversity.

Peterson and Berger found a general pattern where, between 1948 and 1973, their measures of diversity declined when annual concentration rose (and *vice versa*). This general pattern, however, should be approached with circumspection. Some indicators showed less of a relationship with concentration than did others. The annual number of lyrical themes, for example, did not always rise in times of low concentration, nor did it always decline in times of high concentration.

*The argument.* The strength of Peterson and Berger’s (1972, 1975) research lay not in their measures of diversity but in their informed historical account. They argued that the impact of concentration is embedded in a cyclical pattern where long periods of concentration and homogeneity are separated by short periods of competition (*i.e.*, de-concentration) and diversity. Their argument can be summarized in the following schematic fashion. Long periods of concentration occurred as majors thwarted independents by commandeering both artistic talent and distribution channels. Short periods of competition occurred when unique historical factors produced a gap in the majors' control. Independents exploited these factors in order to gain access to a wide consumer audience. This access produced a flurry
of attention from consumers whose tastes were not served by the majors, thus initiating a period of competition and diversity that lasted until the majors absorbed this new challenge.

**Historical setting.** Peterson and Berger (1975; see also Peterson 1990) used their cyclical argument to explain the dramatic changes of the mid-1950s. Prior to this time, the majors stressed the Tin Pan Alley songs that had generated their past success while intentionally eschewing the emergent styles of rhythm & blues and rock’n’roll (Gillett 1983; Ryan 1985). The conservatism of the majors, then, led them to overlook the burgeoning demand of teens for “music with a beat” (*Billboard* 1954b). Independents were more than happy to exploit this demand. Moreover, they benefited from a unique confluence of factors -- such as the emergence of radio stations that targeted teens and the development of transistor radios. A host of independents -- such as Atlantic, Chess, and King -- quickly prospered. Their collective success severely challenged the dominance of the majors (Gillett 1983). Thus, according to Peterson and Berger, a brief period of diversity and low concentration emerged around 1955.

The majors found ways to quash the newfound success of the independents. Each, for instance, engaged in “talent raids” whereby its staff lured newly successful R&B and rock’n’roll performers away from independents. RCA enjoyed the biggest coup by acquiring Elvis Presley’s contract from Sun Records; Decca Records had comparable success when it signed Buddy Holly and Bill Haley. These and other practices enabled the majors to reestablish their collective dominance. Peterson and Berger (1975) argued that another period of high concentration and low diversity ensued (see Gillett 1983).

Peterson and Berger (1975) ended their analysis with 1973. They noted that the negative relationship between concentration and diversity showed signs of weakening. The majors had apparently turned from their conservative ways, and they had aggressively developed rosters of performers that represented a wide range of styles. Thus, Peterson and Berger cautiously regarded the continued applicability of their argument (Peterson 1994; Peterson & Berger 1996). Nevertheless, others have continued to apply the cyclical argument to the post-1973 mainstream market (see Alexander 1990, 1994; Black & Greer 1987; Martindale 1990; Rothenbuhler & Dimmick 1982). Others have extended this
argument to additional media markets, including those for television and motion pictures (Bagdikian 1997; Dominick 1987; Dotinick & Pearce 1976; Philips 1975; Ryan 1985). These subsequent researchers have supported (either empirically or rhetorically) the argument that content diversity declines when a few firms dominate a market. This suggests the following hypothesis for the present study’s time frame: *Concentration will have a negative effect on musical diversity.*

The Open System Account

**Origins.** The emergence of the open system account was informed by empirical anomalies and by a literature on decentralized production. Regarding the anomalies, researchers found that, in the mainstream market of the late 1970s and 1980s, measures of diversity did not decline when concentration was high. They questioned whether the cyclical account continued to apply (Burnett 1992; Burnett & Weber 1990; Frith 1988; Lopes 1992). Their answer lay in a literature that documented the post-WWII movement of US firms toward decentralization (Dowd 1999). Facing volatile markets, many large firms had dismantled their extensive and centralized bureaucracies. They now relied on semi-autonomous divisions that were each run by minimal bureaucracies, and they relied on contractual alliances with small firms. This decentralization supposedly allowed large firms to emulate and exploit the innovativeness of small firms (Hollingsworth 1990; Kanter 1991; Powell 1990), and it was particularly notable in media sectors (Bielby & Bielby 1999; Faulkner & Anderson 1987). Open system proponents considered how decentralization shaped the impact of concentration on diversity.

**The argument.** The open system account can be summarized in the following schematic fashion. In the era described by Peterson and Berger (1975), each major relied on an extensive bureaucracy to produce their respective recordings. A select few supervised and directed a sizable roster of creative and technical personnel. The few in charge typically selected musical material with which they were familiar (i.e., Tin Pan Alley), while the size of the operation encouraged a routinized approach to recording (Dowd 1999). This “closed” system caused the majors to be conservative and inert. Moreover, the majors took steps to quash the success of independents, thereby preventing changes that would challenge their
operations. In this era, then, the success of majors led both to high concentration and low diversity (see Burnett 1992).

In the present era, each major has shifted to decentralized production, which now occurs among a number of semi-autonomous divisions (i.e., subsidiary labels). Supervision is distributed among a host of teams, and the sizable roster of personnel is scattered across the numerous subsidiary labels. Consequently, the preferences of a few supervisors no longer constrain the range of music that is produced, and the low number of personnel at a given label forestalls a routinized approach to recording (Dowd 1999). This “open” system of production allowed large firms to emulate small firms via their divisions. Moreover, the majors now relied on contracts with independents to generate additional recordings. This allowed them to exploit the innovativeness of independents. In this era, then, the success of these majors led to high concentration but did not dampen diversity. Indeed, their success could foster diversity. "The cycles have changed into symbiosis. The new state of competition has to some extent created a musical culture richer in variation" (Hellman 1983, 355).

Past studies have not clearly stated when the open system emerged. Some have merely contrasted the open system of the present to the closed system of the past, without specifying the transitional year (Frith 1988). Others have stressed when the impact of the open system grew most apparent (Burnett 1992; Lopes 1992). That is, they emphasized that high concentration and high diversity co-occurred in the 1980s, but they glossed over the pre-1980s impact of the open system -- when concentration levels were low to moderate (Dowd 1999).

I argue that the open system emerged in 1955, when the majors turned to decentralized production en masse. Each major initially adopted decentralized production so as to emulate the success of the independents and thereby diversify its range of musical products. Consequently, the impact of concentration on diversity changed decisively as the majors pursued a new logic of production. While each major expanded its level of decentralization in the years that followed, such expansion was merely a
manifestation of the logic that surfaced in 1955 – a logic that was immediately conducive to musical diversity. I now elaborate this argument.

**Historical setting.** The 1940s and 1950s brought great changes for the majors. In 1940, Columbia (CBS), Decca, and RCA Victor accounted for 100% of the mainstream market. Yet as the 1940s unfolded, their collective dominance dramatically faded. For example, three new record operations – Capitol, Mercury, and MGM – enjoyed such great success that they joined the ranks of the majors (Sanjek & Sanjek 1991). The success of the newest majors was indicative of a larger trend that escalated well into the 1950s. “In the early 1940s, there were, as a practical matter, only three record companies in the United States: Victor, Columbia, and Decca. Today there are literally hundreds” (US Congress 1958, 54). These “hundreds” of independents typically dealt in musical styles that the majors had not addressed – such as R&B and rock’n’roll. Consequently, consumers who desired such music turned to the independents in droves (*Billboard* 1954b; Gillett 1983).

The majors responded to the onslaught of the independents by establishing subsidiary labels. They did so to diversify their range of products, for mainstream tastes had gravitated away from their Tin Pan Alley recordings and toward those of independents. In 1949, Decca established the Coral label to emphasize R&B music. By 1953, Coral had generated sizeable profits and expanded into country music. Decca soon launched its Brunswick label to offer musical styles that teenagers favored (*Billboard* 1950, 1953b; Sanjek & Sanjek 1991). CBS soon activated the Okeh label to deal in R&B music (*Billboard* 1953a). The trend continued in 1954: “A rundown of the major firms and their subsidiary labels now shows RCA Victor with three via Groove, Camden, and X; Decca with two in Brunswick and Coral; Columbia with two in its Epic and Okeh and Capitol and Mercury with [Kenton Presents and Em-Arcy, respectively]” (*Billboard* 1954a, 14). As 1955 began, all majors had at least one specialized label that extended their traditional offerings in popular music. Such decentralized production allowed the majors to have “pseudo-independents” operating within their respective firms (Dowd 1999).
From 1955 onward, the production of the majors grew more decentralized. First, each major increased its number of subsidiary labels – by either creating new labels or acquiring them. Second, each major augmented its collection of subsidiary labels by contracting with a host of independents. It would typically distribute the labels of independents in exchange for fees, profit shares, and (sometimes) the right to claim independents’ performing acts. Thus, each major could profit off and learn from the independents that it distributed. Finally, each major augmented its subsidiary and distributed labels by creating new labels via joint ventures with independents, which allowed it further to draw on the insights of independents. While pursuing decentralization, the majors reestablished their collective dominance over the mainstream (Clevo & Wilson 1993; Denisoff 1986; Dowd 1999; Sanjek & Sanjek 1991).

Decentralized production had implications for the majors’ musical products: it allowed them to deal in an expanding range of musical styles. Consider Time Warner in the late 1980s and early 1990s, when it presided over more than 75 labels (The Album Network 1994). Time Warner used its labels to absorb new and profitable musical styles. It made inroads into rap music, for example, by contracting with and then acquiring Tommy Boy Records, a noted specialist. Its newly acquired Tommy Boy label, in turn, contracted to distribute the specialized labels of Ill Records and Living Large Records and entered into a joint venture with Stepson Records. The Warner group made similar moves with alternative rock. Its Atlantic Records subsidiary distributed Interscope Records and entered joint ventures with two other specialists: Mammoth Records and Matador Records. These examples only hint at the extent to which decentralized production allowed Time Warner – as well as the other majors – to avoid the stylistic homogeneity found in centralized production (Davies 1993; Hilburn & Philips 1992; McAdams 1992; Nathan 1992).

Open system proponents have posited that concentration levels and musical diversity can both increase when majors succeeded in this era (Burnett 1992; Burnett and Weber 1990; Frith 1988; Lopes 1992). The following hypothesis encapsulates their position for this study’s time frame:
Because of decentralized production, concentration will have a positive effect on musical diversity (Hypothesis 2).

EXTENDING THE MARKET-DIVERSITY LITERATURE

The market-diversity literature contains both untested assumptions and a notable gap. Past studies have assumed that non-musical measures gauge the diversity of popular music. In this section, I move beyond such assumptions by deriving hypotheses (and counter-hypotheses) regarding the relationship between such non-musical factors and musical diversity. Past studies also have been silent regarding the impact of song attributes on musical diversity. I address this gap and offer hypotheses regarding the impact of two such attributes. This section, thus, extends the market-diversity literature in new directions.

Relating Non-Musical Measures to Musical Diversity

Past studies have used, at least, three non-musical measures to assess the diversity of the mainstream market: the annual number of hit records, the annual number of hit records released by independents, and the annual number of hit records released by new performing acts. High numbers for any of these measures purportedly demonstrate the diversity of popular music.

I agree that the above non-musical measures tap diversity. I suspect, however, that they tap types of diversity other than musical diversity; I also suspect that one type of diversity does not always denote another type. Consider, for example, than when researchers measure diversity via the annual number of hit recordings, they are actually gauging supply diversity. The assumption that supply diversity corresponds to musical diversity is problematic: a high number of hit records may actually draw upon a limited range of musical elements (Mondak 1989). Likewise, when researchers measure diversity via the annual number of new performing acts, they are actually measuring producer diversity. The assumption that producer diversity corresponds to musical diversity also is problematic: the songs of new performers have often resembled the songs of established performers in terms of melody and chords (Dowd 1992).

Rather than assume that non-musical measures denote musical diversity, we can actually examine if they do. We can, for instance, examine whether the recordings of independents and new performing
acts are actually high in diversity. Likewise, we can examine whether the annual number of hits has an impact on musical diversity. Because the latter relationship is not readily apparent, I offer a brief elaboration.

Past studies have equated a large supply of mainstream recordings with musical diversity (see Alexander 1990, 83). Given the dearth of information regarding all recordings for a given time period, most contributors have counted the number of hit records. They have counted, for example, how many hit songs are found amid the mainstream market's “Hot 100” charts. These weekly charts detail the hundred most popular songs in terms of both radio airplay and radio sales (Hesbacher et al. 1975). The maximum number of annual hits on the Hot 100 charts is 5100 (i.e., 100 hit songs for 51 weeks per year, with one week off for the holidays). However, the number has always fallen well short of the maximum because many hit songs occupy the charts for multiple weeks; indeed, the most popular songs can remain on the charts for months. Thus, the annual number of hits is lowest (i.e., least diverse) when songs occupy the charts for an extended time, and it is highest (i.e., most diverse) when songs occupy the charts for a brief time. If such supply diversity corresponds to musical diversity, then, we would expect that songs that spend a long time on the charts are less musically diverse than songs that occupy the charts for a short time. That is, the most popular songs likely are the least diverse. Such a hypothesis is consistent with past studies which find that listeners typically gravitate toward the familiar and conventional rather than the unfamiliar and diverse (Russell 1986; Simonton 1997).

For the above non-musical measures of diversity to be valid measures of musical diversity, the following hypotheses must obtain: Songs that remain on the charts for short periods of time are more musically diverse than songs that remain on the charts for long periods (Hypothesis 3). Songs of independents are more musically diverse than songs of majors (Hypothesis 4). Songs of new performing acts are more musically diverse than songs of established acts (Hypothesis 5).
Counter-Hypotheses Regarding Independents and New Performers

Because of their assumptions, contributors to the market-diversity literature have not examined alternate hypotheses for their non-musical measures of diversity. Other literatures, however, have suggested counter-hypotheses for independents and new performers. Regarding independents, many have agreed that independents contribute to musical diversity. However, some have suggested that independents do so in an indirect fashion (Anderson et al. 1980). Independents have often introduced raw prototypes of new styles into the mainstream market. As the majors absorbed and refined these new styles -- which expanded the range of musical elements that the majors produced -- the musical diversity of hit songs increased.

This counter-hypothesis is not unusual considering the musical history of independent. They ruptured the dominance of the majors with rough rock'n'roll hits in the mid- to late-1950s. Their hit songs, while different from those of the majors, drew on a very limited range of musical options. Consequently, the rock'n'roll hits of the independents were not as musically diverse as those of the majors. Many independents that had hits in subsequent decades likewise released records that were different from, but not necessarily more musically diverse than, those of the majors. The folk music they released in the late-1960s, for instance, was similar to early rock'n'roll with its reliance on a limited range of musical options; this was also the case for disco and punk in the 1970s and new wave music in the early 1980s (Gillet 1983; Hamm 1979, 1981). This suggests the following hypothesis for the time frame of this study: Songs of independents are less musically diverse than those of majors (Hypothesis 6).

Regarding new performers, I diverge from previous versions by claiming that the songs of established performers are more musically diverse than those of new performers. My claim resonates with romantic images of established performers pushing the artistic envelope (Martindale 1990; Simonton 1997). I also make this claim because of the financial and artistic constraints faced by new performers. When creative personnel -- including musicians -- lack economic resources and autonomy, they often
forego their aesthetic agendas in order to secure a living (Becker 1982; Faulkner 1971, 1983; Rosenblum 1978).

Performers who are new to the record business must overcome certain hurdles. For instance, they are charged for the costs of making their album. They typically will not receive any share of their record sales until these production costs are settled. When their record sales do cover not production costs, then this debt is typically applied to the sales of their next record (along with the latter recording’s costs). If new performers have any control over the type of material they record, they will most likely draw on a musical style that has already proven to be profitable -- so as to generate enough revenues to cover their production costs. It is more likely, however, that the record company will select all or some of their material. Once again, the material will most likely draw on a musical style proven to be "profitable" (Resnicoff 1992; Shemel & Krasilovsky 1990).

Established performers have historically faced fewer economic and creative constraints than new performers. Regarding economic constraints, established performers typically have higher royalty rates, which allow them to pay off production costs quickly. Many established performers also have earned significant amounts of money from the music catalogs of songs they have written. Economic worries for some are virtually eliminated by multimillion-dollar contracts for future products (consider Aerosmith’s six million dollar bonus for merely signing with Sony Music’s Columbia label). Regarding creative constraints, select performers are granted control over the recording process. Such control ranges from being allowed to write and/or produce their own material to the establishment of a personal label in order to shield their products from the control of their corporate sponsor -- examples of the latter include The Beatles’ Apple label (Goodman 1992; Wright 1983).

Given the range of economic and creative autonomy that established performers enjoy, it is reasonable to argue that their songs are more musically diverse than those of new performers. This autonomy may merely result from being in the business for many years. However, such autonomy may only accrue to those who have control over the recording process. That is, diversity may only thrive when
a performing act writes its material, produced its recordings, or operates its own record label. This suggests the following hypotheses: Songs by performers who have been active for many years are more musically diverse than songs by new performers (Hypothesis 7a). Songs by performers who have control over the recording process are more musically diverse than songs by those who lack such control (Hypothesis 7b).

**Song Attributes and Musical Diversity**

Because of its inattention to musical content, the market-diversity literature has implied that diversity plays out in a similar fashion for all hit songs. In contrast, I argue that hit songs are not all alike; they differ, most notably, in terms of their relative length and in the proportion of the song devoted to instrumental passages. These two characteristics affect the level of musical diversity by restricting or promoting the level of musical development that is possible. Past studies have found that long duration permits an exploration of musical material that is not possible in short songs; consequently, I expect that relatively long songs are more diverse than short songs (Dowd 1992; Simonton 1997). Past studies also have found that song with extended instrumental passages tend toward musical complexity and originality, while songs with limited instrumental passages tend toward simplicity and conventionality; thus, I expect that former will be more diverse than the latter (Dowd 1992; Simonton 1997). It is imperative to consider such characteristics when examining musical diversity in the mainstream market: *Songs of relatively long duration are more musically diverse than songs of relatively short duration (Hypothesis 8). Songs with extended instrumental passages are more musically diverse than songs that lack such extended passages (Hypothesis 9).*

**DATA AND METHODS**

**Setting the Time Frame**

The time frame for the present study extends from 1955 to 1990. I set this time frame by considering both musical and production factors. Regarding musical factors, 1955 marked a sharp break in the content of mainstream recordings. The elaborate and orchestrated songs of Tin Pan Alley (see
Hamm 1979; Wilder 1972) gave way to the rudimentary, stripped-down songs of rock’n’roll and R&B (Hamm 1981; Gillett 1983; Peterson 1990). In the decades that followed, mainstream recordings built on the musical rupture of 1955. That is, subsequent recordings retained some of the rudimentary elements found in 1955 recordings (e.g., simple melodies) while elaborating other elements (e.g., rising chordal complexity) (Dowd 1992; Hamm 1981). Regarding production factors, 1955 marked a dramatic shift among the majors; they collectively eschewed centralized production and embraced decentralized production. In the decades that followed, the majors increased their reliance on decentralized production (Dowd 1999). Thus, 1955 and the decades that followed offer a meaningful musico-historical period (see Middleton 1990). I close with 1990, for the present study is part of a larger project on the first century of musical recording.

**Setting the Sample**

To examine how various factors affect musical diversity, I rely on a sample of Number One songs. Such songs, for a given week, are the most successful mainstream recordings with respect to sales and radio airplay (Anand & Peterson 1997; Hesbacher et al. 1975). I focus on Number One songs because they are the gold standard for market personnel: Number One songs legitimate the range and types of musical elements that will be pursued in subsequent recordings (Anderson et al. 1980; Bowman 1995; Denisoff 1986). Thus, the waxing and waning of diversity among Number One songs hold broader implications for the mainstream market. The 110 Number One songs that I analyze represent nearly a 15% random sample of all Number Ones from 1955 to 1990.⁶

For each sample song, I used the original recording to translate the aural performance to written music so as to apply the musical coding methods described in the appendix. I transcribed each sample song so as to detail accurately the music contained in the recorded performance rather than relying on published sheet music, for the latter is often musically inaccurate (Stich 1990). Some scholars have expressed skepticism about transcription’s ability to capture a musical performance (Bennett 1980; Hennion 1983; Peterson & Berger 1996). Nevertheless, various musicologists have advocated the use of

Musical Diversity: The Dependent Variable

The conceptualization. Diversity is not an inherent attribute of an individual song; rather it results from a comparison of groups of songs (Hillve et al. 1997). Because I gather data on the musical structure of individual songs, I approach diversity by developing a musical dissimilarity index that compares each sample song to those from a similar time period. I treat dissimilarity as any departure from an average. In particular, the degree to which such a departure occurs is the degree to which dissimilarity is present. To illustrate, think of the "average" as a mythical musical formula that allows one to obtain a Number One hit. Imagine also that this mythical formula has ten elements. Each song, in order to be distinct, departs from the formula in some way. The degree to which a song departs from this formula defines that song's dissimilarity. Songs that deviate from two of the elements are relatively more dissimilar than songs that only deviate from one. For all songs that deviate from two elements, those that deviate the furthest are more dissimilar. If the "average" Number One song has a five-note melody, for instance, songs that have nine notes are relatively more dissimilar than songs that have six notes.

The measurement. The musical dissimilarity score for each sample song draws on the twenty-nine quantitative measures described in the appendix. These twenty-nine measures detail each song's melodic, rhythmic, chordal, key, and verse structures.

I took the following steps to construct the dissimilarity index. First, I divided the sample into seven periods: 1955-59, 1960-64, 1965-69, 1970-74; 1975-79, 1980-84, and 1985-90. Second, for each period, I calculated average scores on all twenty-nine elements. I used these period averages to allow for musical changes that may have occurred over time. Third, I calculated Z-scores to see how far a song deviated from its period average on each of these twenty-nine elements. The standard error for these Z-scores, however, draws from the entire 46-year span, not the individual period; I did this so as to provide a common metric for each period's Z-scores. Finally, I summed the absolute value of these twenty-nine
deviations for each song. Simply put, each song's dissimilarity score measures exactly how far it deviates from the period averages on all twenty-nine measures. The higher the total deviation for a song, the relatively more dissimilar is that song from other songs in the same period.

Results. The dissimilarity scores range from 15.62 to 58.43 points of total deviation, with a mean score of 35.77 and a standard deviation of 10.16. These scores also display a pattern, whereby they rise in value across the time frame of the study. Table 1 lists the songs that are the most and least musically dissimilar from other songs in each period. There are two issues to consider when viewing this table. First, the dissimilarity scores are multidimensional. They simultaneously refer to various musical dimensions (e.g., rhythmic and chordal elements). Thus, "Anything for You" earns a high dissimilarity score because its Cubano-based stylings make it different from other songs on many musical dimensions. Second, musical dissimilarity does not necessarily correspond to lyrical dissimilarity. Hence, "Another Brick in the Wall" is very similar to other songs in terms of musical elements despite its unusual lyrical theme.

Table 2 provides an example of how the range of musical elements expanded between 1955 and 1990. As many have noted (Hamm 1979; Middleton 1990), a variety of popular music genres rely heavily on the tonic (I), sub-dominant (IV), and dominant (V) chords. For the uninitiated, these are the same chords that were featured prominently in "Louie, Louie," "Wild Thing," "Tom Dooley," "Good Loving," and "Heartbreak Hotel." As Table 2 indicates, early Number One songs did not deviate very far from these three chords. In later years, however, Number One songs employed a wider chordal pallet by using both an increasing number of chords and a higher proportion of minor chords. Moreover, the placement of these chords grew more varied in later years, with chords often changing in a syncopated fashion (i.e., not on the dominant beats).

Independent Variables

Concentration. Market concentration entails two components: the total number of firms and the respective market shares of each firm. The Herfindahl index simultaneously measures both components.
by summing the squared market share of each firm (Greer 1992). In the present study, the
“Concentration” variable results from a Herfindahl index that gauges the share of hit songs that each
record firm enjoyed. I constructed this index in the following fashion. First, I tallied each of the 19,188 hit
songs found on the Billboard charts from 1955 to 1990. Second, I noted the record label for each of these
mainstream hits. Third, I identified the firm that owned each label at the time of each hit. Fourth, I
documented whether each hit song was distributed by another record firm. Fifth, I followed the
recommendation of Peterson and Berger (1975, 1996) and credited a record firm with a hit song when it
owned or distributed the label on which a given hit was released. This crediting occurred on a case-by-
case basis for each of the 19,188 hits, thereby recognizing the numerous changes in ownership and
distribution arrangements that occurred from 1955 to 1990. Finally, I organized this information into
three-month periods (i.e., quarters). Concentration levels dropped from 1955 to 1960, and they rose
steadily thereafter, as the majors grew more adept at decentralized production (Dowd 1999).

Weeks at Number One. I coded the number of weeks that each sample song maintained its
Number One status. I gleaned this information from the weekly Billboard charts.

Independent. I coded whether each sample song was released by an independent firm. The
coding of this variable relied on the sources listed in endnote 7.

New and established performers. Using Billboard’s charts, I had extensive information on the
various acts found in the random sample. I constructed a life history for each act, detailing when it
enjoyed its first and last mainstream hits. Two variables emerged out of these life histories. First, “New
Performer” is a dummy variable, where “1” indicates that an act is new and “0” indicates that it is
established. Second, “Years as Performer” is a continuous variable that gauges the elapsed time between
an act’s first hit record and its given Number One record.

I created an additional variable that detailed the control that each sample act had over the
recording process. The result was “Performer Autonomy” variable – a dummy variable where “1”
indicates that the performing act was either the sole composer, the sole producer, or the owner of the label
on which the song was released and "0" indicated that the performing act did not enjoy such controls. I derived the writing and producer information from album credits and the label information from the sources listed in endnote 7.

**Song attributes.** I measured the length of each sample song by duration in minutes. I used this information to create the variable, "Relative Song Length." In particular, I created a Z-score that showed how the duration of each song deviated from the average for its five-year period (e.g., 1955 to 1960). By attending to "relative" length, this variable was not plagued by the general trend whereby the absolute duration of Number One songs increased across the time frame of this study.

I measured the proportion of a song devoted to instrumental passages by comparing the number of musical bars that have vocals (of any sort) to those musical bars completely devoid of vocals. The resulting variable, "Proportion of Song Devoted to Instrumentals," does not count the introduction as "instrumental" because that is tapped by a measure used in the dissimilarity index (see Appendix).

**Statistical Method**

In the analysis that follows, I rely on "estimated generalized least squares" (EGLS) regression, for preliminary analysis revealed autocorrelation among my data. EGLS regression is an attractive method because it compensates for autocorrelation and because it yields output that is identical to that of OLS regression (for a detailed summary, see Gujarati 1995). Standard diagnostic tests revealed that the following EGLS models adequately addressed the issue of autocorrelation. Likewise, standard diagnostics revealed the absence of other problems – such as multicollinearity. Thus, the EGLS models that follow offer statistically unbiased estimates and valid significance tests (Gujarati 1995; Neter *et al.* 1983).

**RESULTS**

Results of the quantitative analysis strongly support the open system account. During the era of decentralized production, musical diversity thrived in the presence of high concentration. The results also extend the market-diversity literature in several ways. First, net of concentration, two non-musical factors had strong effects: songs that were Number One for a brief time were musically diverse, and autonomous
performers created musically diverse songs. Second, net of other factors, two non-musical factors had no
effect: neither new performers nor independents released Number One songs that were musically diverse.
Finally, song attributes displayed strong effects: Number One songs with relatively long duration and
with extended instrumental passages were both musically diverse.

Table 3 contains the models by which I tested Hypotheses 1 through 9. Due to missing
information, five of the sample songs were excluded from the analysis. Thus, Tables 3 details the results
for the remaining 105 cases.

Equation (1) demonstrates the impact of market concentration on musical diversity, thereby
testing the competing hypotheses of the cyclical and open system accounts. Cyclical proponents posited a
negative relationship between concentration and diversity (Hyp. 1), whereas open system proponents
argued that decentralized production eliminates (Hyp. 2) the negative impact of concentration on
diversity. Equation (1) supports the open system account and contradicts the cyclical account. From 1955
to 1990, when decentralized production prevailed, high concentration encouraged musical diversity. In
results not reported here, I examined the possibility that the positive effect of concentration on diversity
did not materialize until the early 1980s (see Burnett 1992; Lopes 1992). I found no support for such an
effect. Thus, the present result resonates with my study on new performing acts, where the impact of
concentration changed in 1955 as decentralized production became the norm (Dowd 1999).

Equation (2) considers the impact of non-musical factors on musical diversity (Hypotheses 3
through 5). Past contributors to the market-diversity literature have assumed that these factors tap the
diversity of popular music. Equation (2) shows that only one non-musical factor is related to musical
diversity. Songs that occupied the Number One status for many weeks were less musically diverse than
those that occupied the Number One status for one week. This would suggest that supply diversity (i.e.,
the rapid turnover among hit songs) corresponds with musical diversity. Indeed, in results not reported
here, I also considered the total number of weeks that each sample song occupied the Hot 100 charts. The
results were substantively identical: the most diverse songs were the least popular and, thus, exited the
charts quickly (see Russell 1986; Simonton 1997). The other non-musical factors do not conform to the assumptions of past contributors. Songs released by independents were less musically diverse than those released by majors. This contradicts Hypothesis 4 and supports the counter-hypothesis (Hyp 6) that independents provided the raw and prototypical styles that majors later elaborated (Anderson et al. 1980). New performing acts did not significantly differ from other acts in terms of musical diversity (Dowd 1992). Thus new acts, like independents, were not the sponsors of innovation in the present sample; in other words, producer diversity does not correspond to musical diversity.

Equation (3) offers a further investigation of counter-hypotheses (Hyp. 7a and 7b), and it also demonstrates the impact of song attributes (Hyp. 8 and 9). Regarding counter-hypotheses, the results reveal that an extended career in the mainstream market did not result in musically diverse songs. Instead, musical diversity resulted when performing acts gained some control over the recording process. This is consistent with other studies that likewise find creative autonomy has an impact on content (see Becker 1982; Rosenblum 1978). Regarding song attributes, Equation (3) shows that musical diversity varied among Number One songs; the most musically diverse songs were those with relatively long duration and those with extensive instrumental passages. This resonates with past research that finds similar patterns, including studies that address classical compositions (Dowd 1992; Simonton 1997). In results not reported here, I also examined whether song tempo had an impact on musical diversity (Simonton 1997). I found no such effect.

Equation (4) examines the significant variables found in previous equations. For the most part, the substantive results remain similar, thereby speaking to the robustness of the findings. One finding, however, does change. In the presence of other significant variables, the negative effect for independents disappears. This is not surprising given that, in this sample, independents were more likely to have new performers rather than established performers; they were also likely to release songs of short durations and songs with limited instrumental passages. That is, independents typically did not deal in the creators or song attributes that fostered musical diversity. Equation (4) thus offers further support for the open
systems account, yet it also challenges the market-diversity literature by showing that performer autonomy and song attributes strongly shaped musical diversity.

CONCLUSIONS

I opened this paper by claiming that the analyses of musical content would enrich the sociology of music and cultural sociology. To demonstrate my claim, I turned to a literature that examines the diversity of popular music. This literature proved useful because its contributors have offered competing accounts regarding diversity in the mainstream recording market. Proponents of the cyclical account have stressed the negative impact of market concentration: high concentration dampens musical diversity. Proponents of the open system account have stressed the changing impact of concentration: when centralized production reigns among the majors, high concentration reduces musical diversity; when decentralized production reigns among the majors, high concentration and musical diversity can co-occur. This literature thus invites an explicit analysis of musical content.

By analyzing musical content, the present study adjudicates between the cyclical and open system accounts. I demonstrated that, from 1955 onward, each major approached the mainstream with an expanding web of subsidiary labels, distributed labels, and joint ventures (see also Dowd 1999). By emulating and contracting with numerous independents, each major increased the range of musical products that it offered. Given such decentralized production, open system proponents have hypothesized that concentration levels and musical diversity can both increase when majors succeeded (Burnett 1992; Hellman 1983; Frith 1988; Lopes 1992). The quantitative results from the present study support this account. From 1955 to 1990, the musical diversity of Number One songs grew more pronounced as concentration increased. This finding, in turn, disconfirms the cyclical account because the negative relationship between concentration and musical diversity did not materialize.

By analyzing musical content, the present study also extends the market-diversity literature. First, changing levels of musical diversity were not solely predicated on market concentration; musical diversity also varied among different types of songs. Number One songs with relatively long durations
were more musically diverse than those with relatively short durations. Number One songs with a large proportion of instrumental passages were more musically diverse than those with a small proportion. In the future, then, contributors to the market-diversity should refrain from treating mainstream songs as a homogenous group. Second, the musical diversity of Number One songs was not predicated on being released by independent labels or by new performers. These findings stand in stark contrast to the market-diversity literature, for its contributors have long assumed that independents and new performers are the founts of diversity. Finally, performing acts with control over the recording process – rather than new performers – were the sponsors of musical diversity. This finding not only serves as a corrective to the market-diversity literature, it also resonates with quantitative studies which find that established creators push the artistic envelope (Martindale 1990; Simonton 1997) and with qualitative studies which find that creative autonomy fosters diverse content (Becker 1982; Faulkner 1971, 1983; Rosenblum 1978).

While the present paper demonstrates how the analysis of musical content enriches the sociology of music, it also enriches cultural sociology by suggesting avenues for future research. Much scholarship shows that media firms have embraced decentralized production the post-WWII era (Powell 1990). In the motion picture business, for example, dominant firms have abandoned in-house production of films \textit{(i.e., centralized production)} and have adopted a project-based approach \textit{(i.e., decentralized production)}. These dominant firms now release films that typically result from temporary combinations of firms and freelance workers, where each combination disbands upon completion of a given film (Bielby & Bielby 1999; Faulkner & Anderson 1987). Researchers have noted comparable moves toward decentralized production in television and publishing (Bielby & Bielby 1999; Long 1992; Thorton 1995). The present analysis of musical content suggests that future studies should examine how decentralized production and concentration combine to affect the content of movies, television shows, and book; future studies should also attend to the impact of creative autonomy and to key attributes of these media products. The present content analyses, then, could serve as guide to studies beyond the mainstream recording market.
1. Two studies previously examined the impact of concentration on various musical elements, but neither examined musical diversity per se (Anderson et al., 1980; Dowd 1992). Alexander (1996) examined the relationship between concentration and musical diversity; however, this analysis was plagued by a number of problems, as Peterson and Berger (1996) detailed.

2. Musicologists, psychologists and others also have relied on quantitative analyses of musical content (Alexander 1996; Cerulo 1988; Lomax 1968; Martindale 1990; Maultsby 1974; Simonton 1997). "[Because] music is the most mathematical of all forms of artistic expression, its products are quite amenable to computerized content analyses" (Simonton 1997, 119).

3. Some refer to this as the "pop" market (Anand & Peterson 1997). I avoid this moniker because others use "pop" to describe a wide range of musical styles, including those that emanate from the R&B and country markets. To avoid confusion, I use "mainstream" to describe this market – a moniker that industry personnel often use.

4. "Label" refers to the organizational identity and/or logo prominently displayed on each recording. During the closed system era, the label often (but not always) shared the name of the owning firm (Peterson & Berger 1975, 171). RCA Victor, for example, released its recording on the RCA Victor label. In the open system era, the ownership of multiple labels undermined this correspondence between label and firm name. RCA, for instance, began releasing recordings on its X and Groove labels (Gillett 1983).

5. I do not include the measure of lyrical diversity in the present study for two reasons. First, it demonstrated an ambiguous relationship with concentration after the 1950s (Peterson & Berger 1975). Second, like Walser (1993), I believe that a detailed focus on musical content is necessary because sociologists historically have fixated on lyrical content at the expense of musical content. Of course, I recognize Peterson and Berger's (1996) call to include lyrical elements in the investigation of musical diversity. Nevertheless, the inattention to musical diversity must be redressed before we move to analyses that combine musical and lyrical diversity.

6. I constructed my sample by randomly selecting among the 781 Number One songs that occurred from 1955 to 1990. If I had sampled by time intervals (e.g., songs that were Number One on a given date), my sample would have been biased because songs that were Number One for many weeks would more likely be selected than songs that were Number One for only one week. Because of my sampling scheme, I do not have an equal number of songs for each year, but I do have an unbiased sample of Number One songs.

APPENDIX

The musical dissimilarity scores for the sample songs are made by an index of twenty-nine quantitative measures of musical structure. These measures describe each song's melodic, rhythmic, chordal, key, and verse structures. The measures are derived from a method developed by Cerulo (1988) and are modified so as to be continuous. The construction of the index is described in the text.

MELODIC STRUCTURE

It is useful to think of melody as the mathematical division of time and pitch. A melody divides time by placing its notes at successive points in its duration (e.g., the first note may fall on the third beat of the melody). A melody divides pitch by placing each successive note at either a higher/lower pitch or the same pitch as its predecessor. If we think of time and pitch together, we see that each melodic note occupies a unique position in relation to the other notes in the melody.

Five measures are used to assess how all the notes of a melody are located in pitch and time. To make these measures more intuitive, I discuss them in light of the time/pitch graph for "My Love" presented in Figure 1. Note that the horizontal axis represents the division of time in terms of the beat of the song. The vertical axis represents the division of pitch. Pitch is scored by labeling the first note of the scale -- the tonic -- as "0." The number of half-steps that a pitch departs from the tonic yields the score for that note. This means that in the key of C major, we establish a baseline by coding one particular octave of "C" as "0." As the pitch rises from this baseline we get higher scores. Thus a "C sharp" is scored as "1," a "D" is scored as "2," and so on. As the pitch falls below this baseline "C," we simply use negative scores.

1. "Frequency of directional change" details the number of times a melody changes direction per musical bar. In the graph, such a change is represented by each of the "sawtooths." I count the number of directional changes per musical bar. The score of 1.83 for "My Love" indicates that its melody changes direction almost two times per bar.

2. "Magnitude of melodic change" details the average size of changes in direction (e.g., the size of the sawtooths). The average size of directional change in pitch for "My Love" is 8 half-steps.

3. "Melodic disjunctness" details the number of directional changes between individual melodic notes that are large (e.g., more than 4 half-steps). Nineteen percent of all melodic intervals in "My Love" are large.

4. "Ornamentation" details the degree to which multiple musical notes occur for a single verbal syllable. An ornamentation score of "1" indicates that no ornamentation occurs; the further the score departs from one, the more ornamentation is present in the melody. The score of 2.57 for "My Love" indicates that there is a fair amount of ornamentation in its melody.

5. "Range" details the number of unique half-steps encompassed by the melody. The range of "My Love" entails 18 half-steps.

RHYTHMIC STRUCTURE

Seven measures are used to assess the rhythmic structure of each sample song. The first five measures focus on the respective rhythmic patterns of melodic and bass lines (for a total of ten measures).
The remaining two measures deal with the time signature of each Number One song.

(1) "Frequency of rhythmic change" details how often melodic notes change duration. This measure is calculated by first creating a duration/time graph, similar to the time/pitch in Figure 1. The horizontal axis details the numerical order in which each melodic note occurs (e.g. first note, second note). The vertical axis details the duration of each melodic note where "1" equals a note whose duration has one beat, "2" equals a note whose duration equals two beats, and so on. I count the number of changes (i.e., sawtooths) per musical bar. This measure is also constructed for the bass line of each song.

(2) "Magnitude of rhythmic change" details the average size of the melodic rhythmic changes in direction (e.g. the size of the sawtooths). The calculation of this measure is the same as that for "magnitude of melodic change." The difference being, however, that the "sawtooths" are taken from a duration/time graph not a pitch/time graph. This measure is also constructed for the bass line of each song.

(3) "Rhythmic density" details the number of melodic notes that occur per one beat of the song. This measure is also constructed for the bass line of each sample song.

(4) "Rhythmic syncopation" details the proportion of all melodic notes that are syncopated. Syncopation occurs when a note is attacked on a weak metric position and holds through a strong pulse (or sub-pulse) of a musical bar. The level of bass syncopation is measured similarly.

(5) "Average duration of notes" details the average length, in beats, each melodic note is sustained. This measure is also constructed for the bass line of each sample song.

(6) "Number of time signatures" simply details the number of time signatures found in a song.

(7) "Proportion of dominant time signature" details the proportion of the song, in musical bars, for which the most frequent time signature is in effect. If there is only one time signature for the entire song, the score equals "1."

CHORDAL STRUCTURE

(1) "Total number of chords" details the sheer number of chords employed in the song.

(2) "Chordal density" details the number of chord changes that occur for each beat of the song.

(3) "Chordal consonance" details the proportion of melody and chord pairings that are consonant. Consonant pairings are defined as major and minor thirds, fourths, fifths, major and minor sixths, octaves and unison. Dissonant pairings are defined as augmented fifths, diminished sixths, major and minor sevenths.

(4) "Proportion of major chords" details the proportion of all employed chords that are major.

(5) "Proportion of minor chords" details the proportion of all employed chords that are minor.
(6) "Proportion of tonic chords" details the proportion of all employed chords that are tonic (I).

(7) "Proportion of subdominant chords" details the proportion of all employed chords that are subdominant (IV).

(8) "Proportion of dominant chords" details the proportion of all employed chords that are dominant (V).

**KEY STRUCTURE**

(1) "Number of keys" simply details the number of keys found in a song.

(2) "Proportion of dominant key" details the proportion of the song, in musical bars, for which the most frequent key is in effect. If there is only one key for the entire song, the score equals "1."

**VERSE STRUCTURE**

(1) "Average length of sections" details the typical size of musical sections found in a song. "Sections" refer to the distinct musical/lyrical segments contained in each song (e.g. verse, chorus, bridge). Sections are delineated by focusing on lyrical indicators (e.g. repetition) as well as resolved musical cadences.

(2) "Proportion of introduction" details the proportion of the song, in musical bars, that is devoted to the introduction.
REFERENCES


*Billboard*. 1950. “Decca’s Sales up 25 to 30%. February 11:14


<table>
<thead>
<tr>
<th>Period</th>
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<td>(0.04)</td>
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<td>1965-69</td>
<td>6.16</td>
<td>0.92</td>
<td>0.84</td>
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<td>(2.73)</td>
<td>(0.13)</td>
<td>(0.17)</td>
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<td>1970-74</td>
<td>8.00</td>
<td>0.94</td>
<td>0.74</td>
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<td>(3.44)</td>
<td>(0.10)</td>
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<td>1975-79</td>
<td>7.67</td>
<td>0.93</td>
<td>0.76</td>
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<td>(3.60)</td>
<td>(0.14)</td>
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<td>1980-84</td>
<td>9.00</td>
<td>0.82</td>
<td>0.61</td>
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<td>(3.76)</td>
<td>(0.14)</td>
<td>(0.15)</td>
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<tr>
<td>1985-90</td>
<td>8.50</td>
<td>0.78</td>
<td>0.68</td>
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<td>(2.28)</td>
<td>(0.20)</td>
<td>(0.21)</td>
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<tr>
<td>1955-90</td>
<td>7.13</td>
<td>0.91</td>
<td>0.75</td>
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<td>(3.11)</td>
<td>(0.15)</td>
<td>(0.19)</td>
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Note – Standard errors are in parentheses.
Table 3. EGLS Regression Estimates for Musical Diversity: Number One Songs, 1955-1990

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<tr>
<th></th>
<th>Equation 1</th>
<th>Equation 2</th>
<th>Equation 3</th>
<th>Equation 4</th>
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<tr>
<td>Concentration</td>
<td>74.16** (19.46)</td>
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<td>59.01** (19.47)</td>
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<td>Weeks at Number One</td>
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<td>-1.10** (.45)</td>
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<td>-2.44 (1.66)</td>
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<td>New Performer</td>
<td>-1.02 (2.10)</td>
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<td>Years as Performer</td>
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<td>.15 (.18)</td>
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<td>Performer Autonomy</td>
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<td>6.24** (2.42)</td>
<td>4.62** (2.28)</td>
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<td>Relative Song Length</td>
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<td>1.91** (.79)</td>
<td>1.84** (.74)</td>
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<td>Proportion of Song</td>
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<td>12.92** (3.83)</td>
<td>10.44** (3.63)</td>
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<td>Devoted to Instrumentals</td>
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<td>F</td>
<td>14.5**</td>
<td>4.8**</td>
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<td>R²</td>
<td>12.4</td>
<td>12.5</td>
<td>20.0</td>
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* p < .05; ** p < .01 (one tailed tests); N = 105

Numbers in parentheses are standard errors
Figure 1

Time/Pitch Graph for "My Love" (excerpt)