New Media & Society
http://nms.sagepub.com/

Making music behave: Metadata and the digital music commodity

Jeremy W. Morris

New Media Society 2012 14: 850 originally published online 28 February 2012
DOI: 10.1177/1461444811430645

The online version of this article can be found at:
http://nms.sagepub.com/content/14/5/850

Published by:
SAGE
http://www.sagepublications.com

Article

new media & society
14(5) 850–866

DOI: 10.1177/1461444811430645
nms.sagepub.com
SAGE

Making music behave: Metadata and the digital music commodity

Jeremy W. Morris
University of Wisconsin, USA

Abstract
This article offers a case study of the Compact Disc Database and ID3 tags, two instrumental information technologies for digital music on computers. Using an interpretive analysis of the technical and cultural features of the Compact Disc Database and ID3 tags as well as press releases and journalistic accounts detailing the rise of these services, this article places digital metadata within the broader history of recorded music specifically and digital objects more generally. Started as hobby projects, the Compact Disc Database and ID3 tags have evolved into central components of the digital music ecosystem. As keystone technologies, they contributed to the emergence of a digital music commodity. Since both technologies derive much of their value from user contributions, this article also contributes to current theorization on the role of users in the production of digital commodities.

Keywords
Compact Disc Database, cybernetic commodities, digital music, Gracenote, ID3 tags, metadata, music industries, user-generated content

Introduction

At the time of its launch in 1996, the TuneBase 2000 probably sounded like a futuristic device. Its name called forth images of a yet-to-unfold millennium; its features promised a new world of sound entertainment. The TuneBase 2000 was a multi-disc compact disc player that held hundreds of CDs (Wilson, 2000). What set the TuneBase 2000 apart from similar devices was that it held a small computer-like database of album names,

Corresponding author:
Jeremy W. Morris, Department of Communication Arts, University of Wisconsin, Madison, 821 University Ave, Madison, Wisconsin 53706, USA
Email: jwmorris2@wisc.edu

track titles, and cover art for hundreds of popular CDs (Culbertson, 1997). When users inserted a CD, the TuneBase 2000 would 'recognize' it, call up its associated information, and display it on a TV screen. While the US$2500 device was geared towards rich audiophiles, Scott Jones, CEO of the company behind the device, believed it met an important new demand: 'These mega-changers have no idea what's in each individual slot. If you look at CD number 63, track 5, it becomes a black hole. No one remembers their CDs by number' (quoted in Pletz, 1998).

Today's music users do not need to remember CDs by number; instead, we have metadata. Among other things, metadata – the data about the data on CDs or in digital files – tell us what song we are listening to, which album it is from, and the name of its performer. Traditionally this information came from CD or album packaging, but the migration of music to computers created, in Jones's words, a 'black hole': a space where no light seeped out, an information dead zone.

Perhaps a touch hyperbolic, the metaphor rightly points to the central role information *about* our music plays in our experiences of popular music. Album art, liner notes and similar information comprise what Jonathan Gray (2010) or Will Straw (2009: 86) refer to as 'paratexts': the extra-textual elements that prepare audiences for the reception of texts. Not just limited to packaging, paratexts include movie trailers, advertisements, promo campaigns and other discourses surrounding cultural products (Gray, 2010). Paratexts add meaning to the texts themselves; they are both part of the text and about it. While the digitization of music has had wide-reaching cultural (Jones, 2000; Katz, 2004; Sterne, 2012; Théberge, 1997), structural (Burkart and McCourt, 2006; Garofalo, 1999) and legal implications (Gillespie, 2007; Lessig, 1999, 2004; Vaidhyanathan, 2003), it has also directly altered the way we interact with the music commodity's most immediate paratexts. This has consequences for our experience of music and for the industrial production of the music commodity.

Accordingly, this article presents case studies of the Compact Disc Database (CDDB) and ID3 tags in order to contribute to theories of digital objects and aesthetic experience. Through an interpretive analysis of the features of these two instrumental music information technologies as well as a critical reading of press releases and journalistic accounts, these cases of the CDDB and ID3 tags place digital metadata within the broader history of the recorded music commodity. I argue that, in the mid 1990s, the migration from music on CDs to music as digital files on computers stripped music of much of its contextualizing information (e.g. album art, identifying information, packaging, etc.). Music underwent an *interface-lift* on computers, the internet and various mobile digital devices. It has since been re-dressed with features that rehabilitate its commodity form (e.g. interfaces, digital 'packaging', etc). Metadata have played a key part in this re-contextualization process. They help users recognize, sort, collect and use digital music. They can be loaded with cultural and aesthetic cues or coded with technical instructions and marketing messages. By filling in music's missing information, metadata describe and prescribe music collections on computers. They are keystone technologies that hold various other technologies in place and help them interact. In short, metadata mediate listeners' experiences with music. They contribute to the rise of what could be called a digital music commodity.[1]

Given the role users played in the development of the CDDB and ID3 tags, this article also reveals the complex nature of digital commodities. The CDDB and ID3 tags incorporate users in the creation and maintenance of metadata, implicating their labour in the production of digital music as a commodity. More specifically, metadata capture the work of music fans in circuits of what Vincent Mosco (1996) or Mark Andrejevic (2007) refer to as cybernetic commodification. However, by allowing users to re-dress unauthorized downloaded files as commodities, metadata also trouble the standard logic of commodification. As an increasing amount of goods undergo their own digital transitions (photos, movies, documents, etc.), understanding the history and role of metadata is thus not just a question for music. At stake more broadly are issues about how we encounter commodities in our culture, and what meaning those commodities have when they assume a digital form.

Metadata and digital objects

Within seconds of loading an audio CD into a computer, a user's media playback program (e.g. Windows Media Player, iTunes, etc.) typically flashes the name of the CD and the artist, a list of songs, their various lengths, and other details. It is a process that occurs so quickly it is easy to miss the complex set of connections and calculations taking place. It is as if all the information was already there on the CD, ready to be revealed on screen. But the data are not on the disc or anywhere else on the computer. Repeat the process without an internet connection and, instead of an informative layout of song names and album titles, all that appears is the most unimpressive of lists: track 01, track 02, track 03…

The data that describe the music on CDs or in digital files – the data that turn track 01 into a more useful label – are known as metadata. Metadata are not strictly a musical affair. The term surfaces in the 1960s and is frequently discussed in literature on databases and library studies (Vellucci, 1999). The topic's recent rise in prominence coincides with the digitization of data (of all kinds) and the need for librarians, archivists and hobbyists to organize electronic resources and internet-based information (Dempsey and Heery, 1998; Greenberg, 2003a; Mathes, 2004; Vellucci, 1999). There are disciplinary debates about definitions, though most agree metadata is structured 'data that describes the attributes of a resource, characterizes its relationships to other resources [… and] supports the discovery, management, and use of a resource' (Vellucci, 1999: 205).

Although metadata technically exists for non-electronic resources, some see metadata as a strictly electronic affair (see Greenberg, 2003a; Vellucci, 1999). While largely a matter of semantics, the disagreement begs the question: what, if anything, is new or different about digital metadata when compared to the forms of paratextual information that came before it? Like the bibliographic data and cataloguing structures that exist for physical, non-electronic resources (e.g. a book's Dewey Decimal number or Library of Congress designation), digital metadata engender novel sorting and ordering practices. However, because digital data enhance both the amount of information that can be gathered and the speed with which it can be searched and used (Poster, 1990: 96), the

sheer scope and scale of resources that can be tracked and the attributes that can be assigned to them multiply significantly. Digital metadata also open up the classification process to a wider group of participants. Metadata were historically the province of professional database managers (e.g. librarians, archivists) and technical metadata creators, but the internet and the scores of digital objects it contains have spawned new labelling techniques (Greenberg, 2003a, 2003b). Now, top down, authorial metadata standards like MARC co-mingle with more colloquial, user-generated labelling systems found on sites like Flickr, YouTube or the CDDB.[2]

Metadata for music thus operate within a wider realm of digital objects linked by information that simultaneously describes and constitutes resources. It represents a unique case, however, due to how quickly metadata evolved for handling musical resources, and how thoroughly integrated metadata became into the everyday life of music on computers. Music was ahead of other cultural commodities in fully exploring and making use of the possibilities metadata could provide. Thanks to advances in sound file compression techniques, low bandwidth requirements and music's sheer ubiquity in everyday life, music was better able to provide a consistent – or at least recognizable – experience between its digital and non-digital forms, and metadata were a key reason for this.

Most of the music metadata users encounter comes from the CD Database and ID3 tags. The former provides metadata for CDs in computers while the latter embeds metadata in mp3 files. Although one works on CDs and the other on digital files, they serve similar ends: both help producers and users label, sort, and manage music on computers. Given the ballooning size of today's music libraries, metadata provide essential navigational and archival functions. Metadata's grander promise, however, is to give us better control over our information. Users could leave their music unlabelled in a collection full of track ones and track tens, but this prospect is as daunting for the use of music as it is for its cultural significance. Metadata not only endow files with information; they afford users a measure of ownership and control over those files. Metadata open up a series of connections and possibilities for digital goods as cultural objects and as commodities.

Arguably, music has long had what we could anachronistically call metadata. Album art, liner notes, band photos, inserts, fold-outs and such have all contributed to the materiality of the music commodity over the last century. Even the grooves on a record act like metadata since they refer to track numbers and lengths. While CDs, tapes, and records have individual conventions for presenting this paratextual information (Straw, 2009), metadata has typically remained *outside* the actual media. Song titles, artist names, and production details are found on the packaging (i.e. record sleeves, jewel cases, etc.) or on the media itself (i.e. stamped onto plastic discs or cassettes). The notable exception to this is the CD's table of contents, an embedded list that tells users the number of songs on a disc and displays the length of those songs (Pohlmann, 1992).[3] Still, most of the information contained in the CD, tape, or record is almost entirely audio data.

This reveals a key difference between digital and analog metadata: digital metadata are more thoroughly embedded and networked into the commodity itself. Unlike previous music formats, metadata for digital music seem designed for an era in which users are increasingly likely to encounter music that has been distanced from its

packaging, and often downloaded from unauthorized sources. Digital metadata become part of the product experience. They travel with the files and shape digital music's form and functionality. Metadata insinuate themselves into the music experience and exert architectural effects over the digital music commodity. They describe the information that accompanies music, and prescribe particular ways of classifying and sorting it. The CDDB and ID3 tags are integrated and integral technologies: if consumers want to use digital music or CDs in computers, they will likely encounter the CDDB or ID3 tags.

Building the infrastructure

ID3 tags sprung from the work of Erik Kemp, who created a program called Studio 3 for making and identifying mp3 files (Nilsson, 2006a; Potts, 2002). The first version of ID3, released in 1996, was a relatively simple affair: a 128-byte tag appended to an mp3 file to which users could add the track name, artist name and album title. Other users and programmers built on Kemp's idea, adding more complex tags like track numbers, longer field entries, etc. The current version, ID3v2, is the *de facto* standard for mp3 metadata in most software players (e.g. iTunes, Winamp, etc.), and its utility and flexibility is largely thanks to those who contributed to the file specifications.

Similarly, the CDDB grew from the work of a hobbyist programmer. In 1993, Ti Kan developed an iTunes-type media player called XMCD. In addition to letting users play CDs – something computers were still not adept at then – XMCD matched CDs with information in a database file on the user's computer (Fry, 2001; Kan, 2004). XMCD scanned the CD's table of contents, reading that a disc had, say, 13 songs and that the first song lasted 3 min 42 sec, the second one 2 min 48 sec, and so on (Fry, 2001). The program then looked for matches within the database file and displayed the artist name, track title, etc. to the user (Fry, 2001; Van Buskirk, 2006).

The service caught on and users were soon emailing Kan details on hundreds of CDs to add to the database. In 1995, Kan's friend Steve Scherf moved the database to an online server so users could add new or edit existing entries directly (Fry, 2001; Van Buskirk, 2006).[4] By August of 1998, the database had around 1.2 million entries and was receiving 2 million connections a month. It was the most extensive service of its kind online (Pletz, 1998). At this point, Kan and Scherf sold the CDDB to electronics manufacturer Escient LLC, which began licensing the database to producers of software programs like Winamp and MusicMatch Jukebox. Escient later spun the database into its own company, called Gracenote CDDB, and sold it to Sony in 2008. The service now boasts over 250 million users in over 200 countries (Gracenote, 2010). It powers more than 2000 applications and is 'featured in millions of car stereos, tens of millions of mobile phones and media players, and hundreds of millions of consumer electronics devices' (Gracenote, 2008). The company now uses the CDDB to track consumer preferences, collect sales/play count data, and to offer sophisticated recognition technology (e.g. waveforms, sonic cues, audio fingerprinting) to identify files (Dean, 2004; Palenchar, 2002). In just over ten years, the service has grown from a user-generated metadata storehouse that was initially open source and free to all users and developers,

to a private, licensable and profitable database that provides the backbone for many digital music services and software.

Immaterial labour, metadata and cybernetic commodities

These brief histories point to another key aspect of digital metadata: the development of digital metadata depended heavily on the work and participation of users and happened either outside or in parallel with commercial efforts. The story of metadata is a tale of industrial and technical innovation; but it is also one about users and their role in the commodification process. Given the progression of the CDDB – from amateur hobby project to user-contributed repository to private corporate database – the service allows us to ask important questions about what kind of 'work' users were doing on behalf of digital commodities as they contributed to the creation and maintenance of these metadata technologies.

Certainly, the efforts of CDDB and ID3 users evidence what Maurizio Lazzarato calls immaterial labour: 'the labor that produces the informational and cultural content of the commodity' (1996: 133). Immaterial labour recognizes that many of today's commodities are now produced through 'cybernetics and computer control' as well as driven – not by their tangible utility – but by cultural attributes like taste, preference, fashion and style (Lazzarato, 1996: 133). The 'work' of immaterial labourers is their contribution to fixing these cultural norms. Tiziana Terranova (2004), building on Lazzarato, notes that users provide much of this immaterial work; it is 'free' labour they perform without any kind of formal economic recompense.

Escient's acquisition of the CDDB in 1998 was controversial. What had once been a free and open source resource for developers and users became accessible only through a license (CDDB, 1999; Dean, 2004; Hemos, 1999). Users could still access and contribute to the database for free, but software developers had to pay to use the updated CDDB in their products. Gallingly, the license even stipulated companies could not offer access to other databases in their products (e.g. *CDDB vs Roxio*, see Dean, 2004; Gracenote, 2001a). Reaction in the tech press to this corporate appropriation of user content was predictably negative (Hemos, 1999; Lemos, 2001; Swartz, 2002). Here was a 'house that music fans built' yet one in which they no longer felt welcome; a publicly compiled database put to private ends (Dean, 2004).

On the surface, the CDDB lends itself to a Terranovian analysis. It is a clear case of the exploitation of free or immaterial labour: the appropriation of user-given labour and content into existing corporate structures. However, while the immaterial labour argument explains how certain companies and technologies profit from the value of user contributions, there is another layer to the commodification process to explore in the case of metadata. Since user contributions took place 'within a field that is always and already capitalism' (Terranova, 2004: 80), user involvement implicates them in the commodification of music in its digital format. In other words, just because users helped develop the CDDB and ID3 tags, this did not mean the services were exempt from larger flows of capital or commodification (van Dijck, 2009). In fact, the work of users in this case

ensured that digital music looked and acted like other formats of the music commodity that came before it.

David Hesmondhalgh (2010), in a piece that critiques the ways scholars have taken up the ideas of free and immaterial labour, cautions against over-using terms like 'work' and 'exploitation' when discussing user contributions to the cultural industries and its products. After all, users who contribute data to social network services, or who help create metadata are hardly working or being exploited when compared to the workers in foreign factories responsible for building the hardware our digital lifestyles rely on (Hesmondhalgh, 2010: 271). Even the scores of unpaid interns that fuel the North American cultural industries are more familiar with 'exploited' labour than everyday free labourers who give content, ideas, or work to various online and digital services (2010: 279).

The case of the CDDB and metadata more generally suggest the problem is not necessarily with how corporate entities profit from user labour. Rather, the issue at stake is that users' efforts to make a cultural good more useable in its digital form have led them to take part in the process of commodification, both explicitly – by creating tools that ultimately make the commodity a more sellable thing – and implicitly – by creating tools that eventually allow for greater data tracking, surveillance and cybernetic commodification in general. If we frame the issue solely as a battle over content ownership between Gracenote and its users, we miss an important insight: one of metadata's key functions was to ready digital music files for their moment as commodities. Digital files, as unlabelled chunks of code, are a tough sell. Tagged with a name, an album cover, production credits and other information, they become sellable packages. They can be presented in online stores, organized by genre or other useful groupings and sold in a variety of ways. The CDDB and ID3 tags brought value, in a corporate sense, to digital music by making it recognizable, sort-able and searchable. Metadata was part of the interface for music in its digital form.

The CDDB transitioned CDs to computers and helped sell the idea of computers as a playback device for music. By adding metadata to CDs and making discs recognizable in a new environment, the CDDB endowed music with attributes that distinguished the experience of CDs on computers from that which came before. Without software to automatically recognize and label CDs, users would have had to fill in song names, album titles and artist names every time they inserted a CD into their computer. The privatization and commodification of the database itself, in other words, was secondary to the way metadata was *already at work* in the commodification of digital music.

The CDDB and ID3 tags reveal commodification as a thoroughly cultural affair and not solely an industrial activity. Both technologies depended heavily on the work and participation of their users. Kan, Scherf, and Kemp may not have been driven initially by profit, but their desire to transition music to a new environment – a motivation shared by users and designers of services like the CDDB and ID3 – directly addressed many stumbling blocks to digital music's commodification. As co-developers of metadata, users share a responsibility for readying digital music for its moment as a commodity. In an environment where users are also producers, users take part in the process of commodification. The line between user-generated content and user-generated commodity blurs.

The re-contextualization of music for its new environment, however, also muddies the very notion of the commodity itself. One of the reasons metadata became such a pressing need was the marked increase in the circulation of unauthorized files or legitimate files that had been separated from their packaging. As users ripped music from their CDs (or their friends') or found files through sites like Napster, they used the CDDB and ID3 tags to replace the missing paratextual information. As much as user contributions to the CDDB and ID3 helped establish a digital music commodity, they also let users repackage downloaded music *as if it were* an authorized commodity. The CDDB and ID3 tags simultaneously built the infrastructure for a legitimate digital music market while allowing users to disguise massive quantities of unauthorized files as legitimate commodities. Metadata helped dubious digital objects parade as sanctioned commodities, even if they were acquired without direct payment.

Whether used to add context to purchased files or to cloak unauthorized ones in the guise of commodities, metadata incorporated users' labour into wider circuits of cybernetic commodification. In an information economy, information is both an end commodity and an enhancer of the value of other commodities (Poster, 1990; Schiller, 2007). This is what Mosco (1996: 151) or Andrejevic (2007: 3) refer to as cybernetic commodities: those that are valuable both as commodities and as objects that produce information that can be further commodified (e.g. television ratings, loyalty cards, and database marketing). For Mosco, commodification depends highly on spatialization – the process of overcoming the constraints of time and space – and structuration – the process of understanding how human agency and structures are bound in a mutually constitutive relationship (1996: 151). Cybernetic commodities serve both ends. They make transactions seem more immediate and personal, reducing the time and space of commerce. They also create an info loop where human agency (i.e. consumption patterns) contributes to a structured database that in turn feeds the production process, ultimately circling back to affect the choices of goods, services and commodities we are presented (Andrejevic, 2007: 3; Poster, 1990: 75).

Metadata are part of the increasing commodification of information and the push to track the 'transactions of everyday life' (Poster, 1990: 43, 69–98). They contribute to the ongoing monitoring of consumer tastes and behaviours for the purposes of profit and surveillance (Andrejevic, 2007). Tom McCourt and Patrick Burkart call this 'customer relationship management': a subtle strategy of digital data collection that tracks preferences, customization options and the like (2003: 94). Despite rhetoric that digitization will free music from its commodified form, music as a cybernetic commodity offers greater organized technocratic control over its distribution and consumption (Burkart and McCourt, 2006).

This is yet another distinguishing feature of digital metadata: they amplify the importance of a resource's paratextual elements. Metadata are a key technology for tracking and surveying the flow and use of digital objects, and unlike TiVo or ratings, users contribute metadata knowingly in the hopes of making digital commodities more useable. Metadata turn objects into what Martin Dodge and Rob Kitchin call 'codejects': objects that are 'dependent upon code to function – the object and its code are thoroughly interdependent and nonseparable' (2009: 1348). Dodge and Kitchin (2009: 1351) also use the term 'logjects' to describe objects that are constantly tracking their

own histories and logging other usage information (e.g. TiVos, Smartphones, etc.). I suggest that metadata are at the heart of this process; they are responsible for storing and shuttling information between various pieces of technology. Digital music files are virtual logjects (Beer, 2010: 476) since the files themselves are embedded with information that influences the way they play back. Computers, smartphones, and other portable players all rely on the instructions and cues from metadata to sort, organize and present music to listeners. These same devices can also track what users are listening to and what they think of what they are hearing (through ratings, comments, play counts etc.). User contributions to medatada databases, as well as their everyday use of these logjects, further integrate users into circuits of cybernetic commodification.

Just as TiVo was a 'quantum leap' in the ability of producers to monitor viewers (Andrejevic, 2007: 11), Gracenote transformed the CDDB from a user-generated database for identifying CDs to a massive information repository that stored precious data on the listening habits of a valuable audience. Gracenote sold statistics to record labels on which CDs were popular based on metadata requests on their servers. They also tracked the use of bonus content on CDDB-enabled CDs, helping record labels hone their multimedia marketing campaigns. A true cybernetic commodity, the CDDB provided Gracenote with insights into the tastes and behaviours of millions of users.

Gracenote also used the database to assist the major record labels in their battle against piracy and file-sharing. After Napster's court injunction in 2001, the company faced the monstrous task of removing all copyrighted material from its servers. Gracenote partnered with Napster to help weed out 'hidden' unauthorized tracks with mis-spelled labels (e.g. Boys 2 Men, Boys To Men, Boys II Men), since Gracenote's database already logged many of these inconsistencies. Gracenote continued to develop technologies for tracking files on peer-to-peer networks to help labels identify infringement and to facilitate rights payments (Dean, 2004; Gracenote, 2001b).

This particular usage of the database, and the networked nature of many metadata services, hints at the privacy challenges metadata present. The most blatant example comes from the Recording Industry Association of America (RIAA) in their court case against Verizon in 2003 (*RIAA vs Verizon*). The RIAA used metadata to build their case against individual file-sharers (MSNBC, 2003). By looking at metadata in a suspected user's shared folder on a peer-to-peer network, the RIAA argued the majority of songs came from unauthorized file-sharing sites like Napster and not from CDs that the user owned and ripped, as lawyers had claimed. Most of the files included ID3 tags with comments indicating their original source, for example: 'Ripped by ATOMIC PLAYBOY 1999!', 'Uploaded by Smog', etc. (Whitehead, 2003: 6). Many files also included the URL of the site they were downloaded from and even contained tags encouraging further infringement, like 'SHARE WITH OTHERS' (Whitehead, 2003: 9).

Metadata, then, are not just private and personal labels for ordering our music collection. Depending on where the files are stored, they provide publicly visible documentation about the histories and origins of digital files. Metadata for downloaded files reveal marks left by other users just as metadata users input themselves add their own personal inscriptions to the files. This information colours a user's collection, contributing to how files look and work. Moreover, metadata offer visible evidence of the highly mobile and circulatory nature of digital commodities. They present a history that is perpetually

subject to revision as new tags get added and old ones overwritten, yet a history that, in cases like the above, can be tied to certain behaviours and actions.

Description and prescription

Metadata's integral and integrated nature has a significant affect on the ways digital music appears and works. Although metadata seem like organic characteristics of objects, they are highly constructed for specific purposes like classification, archiving, and accessibility:

> Cataloging appears to be routine work so long as one believes that the materials just have a regular structure which can be trivially read off. But on inspection, it appears that this regular structure is the output of the work of catalogers, not the input. (Levy quoted in Campbell, 2007: 15)

Further, the categories cataloguers create are subjective and highly cultural. Like any system of classification, as Pierre Bourdieu (1991) might argue, metadata are both descriptive and prescriptive. The labels we assign to the things around us are descriptive, but they also set up modes of perceiving and using those things. Labelling and classifying are acts of *performative utterance*: 'a pre-diction which aims to bring about what it utters' (Bourdieu, 1991: 128). Although sorting an album by artist or title seems an innocuous act, it also prescribes how users access and experience their music.

Nowhere is this more evident than the case of classical music, where the genre's initial move online was slower than others (Singer, 2007). While there are various plausible explanations (e.g. demographics, fidelity), classical music faces fundamental informational challenges that do not apply to other genres. Sorting music by artist, album or song title works for genres like rock, pop, hip hop and electronica but classical music requires fields like composer, soloist, conductor, and orchestra (Brown, 2008). The length and format of classical songs also pose problems. How, for example, should users sort suites or movements from the same piece? How can they discern between multiple performances of one piece by different orchestras? Users with several versions of 'Symphony No. 7 in D Minor' need added mechanisms for finding the exact version they want.

These are just some of the issues that confound classical music users. Jazz fans voice similar complaints about metadata's genre bias (Bremser, 2004). Gradually, media players have improved their services for niche genres (e.g. iTunes added a 'composer' category in 2004) and there is a growing number of online stores/resources that cater to these markets (Tsioulcas, 2007). Still, the issues metadata pose for jazz and classical music highlight the problems that arise when databases and tags built for certain resources start accommodating objects that require different sorting strategies. They remind us that ID3 tags and the CDDB are built on culturally inflected categories and attributes that are tied to the social setting in which those technologies evolved.

The ways metadata condition a user's experience of music become increasingly evident as a host of new recommendation technologies emerge (e.g. Pandora, iTunes Genius, Last.Fm, etc.). At a local level, these services use metadata to trace aesthetic and other

connections between sounds and songs that users may have previously seen as distinct. Some of these services use their own databases – Pandora, for example, has hundreds of musicologists and 'record geeks' coding songs with thousands of attributes (Platoni, 2006) – while others, like Last.FM or iTunes Genius make use of a combination of proprietary and user metadata. Here, metadata act as a new nodal point for gatekeeping in the music consumption process. Metadata affect how users sort and sift through their collections, but recommendations based on, and enacted via, metadata affect which genres and artists users are exposed to in the first place. Human or machine-based algorithms predict future preferences by correlating the metadata of previous listening habits. In this way, metadata plug users into a vast repository of commodities on the internet, where the act of listening to a song triggers advice to purchase music by similar-sounding bands, related merchandise, or other linked media properties. Given the size of today's music libraries and the availability of new music more generally, recommendation engines are increasingly central technologies for helping us discover new music and rediscover old favourites buried within our multi-gigabyte collections. Metadata are the keystone technologies that make establishing these connections possible in the first place. As codejects and logjects, metadata extend the reach of our music files, both within our libraries and to other commodities beyond it, and link them to a wider network of goods and practices.

This is where the metadata's informational inconsistencies truly become visible. Many users have likely run into some of these limits, be it with bands that have multiple potential spellings (e.g. Guns and Roses vs Guns & Roses) or those that begin with common articles (i.e. is The Black Keys listed under T or B?). Additionally, incorrect metadata can and do find their way into our libraries. Dates can be wrong, names can be misspelled, and albums can be assigned to genres that make little sense. Since many data-fetching and recommendation processes are automated, inaccuracies propagate widely and quickly. At the most basic level, incorrect metadata can cause problems when trying to locate and play back music, especially in massive libraries. More troublingly, with metadata integrated into sound files and networked to databases outside of the product, decisions and recommendations based on improper metadata become a regular feature of the music experience.

The persistence of flawed metadata for digital music has spawned a secondary market of software like FixTunes and TuneUp that help users correct messy metadata. These automated reconstruction programs condense and expose a process that is continually occurring with digital music: software fetches information from databases that colours and codes our digital collections and the songs that get recommended to us. Metadata's networked nature means that the information that constitutes our libraries comes from a source outside our collections as well as from our own curating. Databases like the CDDB act on our collections from afar in conjunction with our own actions. This is not simply a question of the difficulties users face in finding their music. It is a reminder that metadata are paratexts that change independently of the product to which they are attached. In doing so, they alter the materials and modes through which users encounter that product. Metadata are a user's personal notations mixed with a file's individual history. They are hybrid labels based on information from automated

services and from our own inscriptions; they are the material manifestation of memory, preferences, circulation and information.

Metadata wrap digital files in a layer of highly specific attributes for labelling, sorting and handling music. This is what Jonathan Sterne refers to as digital music's 'micromaterial' qualities: the minute traces of materiality digital files display as they take up hard drive space (2006: 831, 832). While critics claim digital sound files are 'just data, metadata, and a thumbnail' and potentially less valuable than their tactile counterparts (McCourt, 2005: 250), I argue metadata embed value by packaging music with a look that we recognize (i.e. album covers, song titles, etc.) and a functionality we understand (i.e. I want to play song X from album Y). Metadata rehabilitate the music commodity with features that are contextually relevant and specifically useful for a new medium. Through newer versions of the CDDB and ID3 Tags, users can now include album art, rate music, log the beats per minute, attach lyrics, track play counts, add comments and so on (for a list of frames see Nilsson, 2006b). Advanced metadata make libraries searchable not just alphabetically or by date, but by multiple, customizable variables (tempo, favourites, mood, etc.). Some metadata even act on the sound of a file, allowing users to tweak the volume, equalization and reverb settings. Metadata turn a hard drive full of data into a personalized, customized, dynamic music collection.

When we can sort digital music in these ways, it starts to act like music with which we can build a collection. When we can organize songs into temporally, behaviourally, or spatially distinct playlists, we create new histories around them; ones not based on the wear and tear of album covers or scratches on a disc, but ones still intimately tied to use and meaning. Digital files of recorded music may lack some of their original context, but metadata ensure digital music will never be immaterial or impersonal. Metadata re-contextualize music's materiality.

This insight is important across a range of digital objects. I am advancing the idea that in the digital realm, in the absence of traditional markers of packaging and materiality, it falls to the labels themselves, to the paratexts, to give the commodity its shape as well as its use and exchange value. Paratexts play a vital role for digital commodities. Embedded or networked into files, metadata contextualize digital objects. Instead of assuming digital objects are immaterial and intangible simply because they are code, we should focus on how their micromaterials – their digital paratexts – condition how objects perform, how they look and how they are received.

Conclusion

Escient LLC, the electronics manufacturer that first bought the CDDB, was the same company behind the TuneBase 2000. The company was fond of claiming: 'we make technology behave' (Escient, 1998). Like the TuneBase 2000, they hoped the CDDB would bring order to our music collections. Aside from being a nice sound byte for reporters, Escient's unofficial motto is also a useful frame for the larger role metadata play in the commodification of digital music. Metadata bring order to 'misbehaving' music files – files that were stripped of their context and circulating as incomplete commodities. As ID3 tags and the CDDB filled in missing information, they made music on computers look the part of a commodity.

It is easy to underestimate the significance of the CDDB, ID3 tags and the metadata they provide. ID3 tags and the CDDB work quietly in the background and when they do, most users barely notice them. For many, digital music has never looked otherwise. Despite this subtle presence, metadata from ID3 tags and the CDDB make up a defining organizational system for digital music. Metadata are paratexts that prescribe and describe music files. They underpin the everyday practices of digital music and present it as a commodifiable object. They are part of the increasing informationalization of cultural commodities that implicates users in processes of cybernetic commodification (Schiller, 2007: 101).

Given the co-contributions of users and industry to the development of the CDDB and ID3 tags, metadata challenge existing theories of commodification. Metadata simultaneously supported and subverted the emergence of the digital music commodity. They presented digital music in a commercially recognizable and useful form. As users began labelling their digital files and making music intelligible in its new environment, companies like Apple, eMusic or many others could legitimately start treating digital music as a commodity too, subject to prices and practices that governed other commodities.

But metadata also served a crucial purpose for the hundreds of thousands of downloaded files that were circulating in 'unauthorized' settings. Metadata helped order, organize and personalize swathes of files that lacked much of their contextual information. They redressed unauthorized files as legitimate commodities and let users partake in commodity experiences despite the fact they had not acquired the music by traditional means. Sterne suggests that digital music (the mp3 in particular) occupies 'an ambiguous position that is both inside and outside market economies' (2012: 384). These cases confirm this argument and point to the need for more theoretical work on what we might call *disguised commodities*. There have long been pirated goods and knock-off brands, but the prevalence of file-sharing has led to a situation where digital music libraries are regularly hybrids of authorized and disguised commodities. Regardless of the source of the files, users likely feel they 'own' their music, even if this ownership is more 'cultural' than economic (Burkart, 2008: 249). How, we might ask, do users deploy metadata to personalize their libraries, to disguise their commodities, and to create a sense of cultural ownership over their libraries?

There is also room for greater empirical research on the details dormant in metadata itself – and not just musical metadata: the information that now accompanies and structures our experiences with photos, videos, and documents is rich with insight. What does this information tell us about the history and circulation of digital objects? What kinds of historical scholarship might emerge from the large-scale collection and analysis of metadata (of all kinds)? How reliable are the traces metadata leave behind, especially when they are marshalled by the likes of the RIAA and presented as evidentiary proof? These questions suggest metadata have a role to play as a tool for research, not just an object of it.

Although they can be seen as the next iteration in a long line of information that has traditionally accompanied and shaped the experience of music, metadata contribute to the development of the commercial and social life of the digital music commodity. They lead us to music, tell us about it, describe how fast or slow it is, how much other people liked it and how much we liked it last time we listened to it. Metadata tie together

disparate songs in our collections and point us out towards a whole world of sonic links and other commodities. Without metadata – and other paratexts – digital music is just data; just sound created from bits and bytes. This sound is very powerful data; that is undeniable. But it takes the work of metadata to give digital music the context necessary for collecting it, using it, and interacting with it.

Acknowledgments

I would like to thank Jonathan Sterne for his unlimited patience and effort in helping refine this piece. Credit also belongs to Darin Barney and Will Straw for invaluable feedback on earlier versions of this article as well as to the reviewers and editors of *New Media & Society* for their constructive remarks.

Funding

This work was supported by the Social Sciences and Humanities Research Council of Canada and Fonds Québecois de recherche sur la société et la culture.

Notes

1. The music on CDs is, of course, digital. The CD commodity – the packaging, the disc, and the jewel case – is not. The digital music commodity refers to a historical moment where most of the materials that give music its commercial, aesthetic, and functional form manifest themselves largely thanks to computers, the internet or other digital technologies. It is a particular combination of data and sound that exists as an entity in and of itself for sale or acquisition in online outlets via computers or other digital devices.
2. Machine Readable Cataloguing (MARC) structures how catalogue cards are prepared to produce searchable call numbers for library users. These are highly structured classification schemes that are generally static and require specialized training. Flickr, YouTube, etc. feature 'tags': small non-hierarchical keywords that users create. These user-centric schemes are responsive to change, easier to use, and often more participatory/accessible. They are incredibly customizable but can suffer from a lack of universality and accuracy.
3. The original CD also included the international standard recording code (ISRC) code for identifying sound recordings but, like the Universal Product Code (UPC) or the International Standard Book Number (ISBN), these metadata are primarily for manufacturers looking to track their products. There were concerted efforts to add more consumer-useful metadata in the 80s and early 90s. The most well-known was CD-Text: a feature that embedded data about the artist, the album and the tracks in the CD itself ('CD text', 1996). CD-Text was introduced a dozen years after the original CD and it was not backward compatible; its success was modest.
4. Graham Toal was also instrumental in founding the CDDB. He provided server space for the database and suggested advertising to generate revenue (Van Buskirk, 2006).

References

Andrejevic M (2007) *iSpy: Surveillance and Power in the Interactive Era*. Lawrence: University Press of Kansas.

Beer D (2010) Mobile music, coded objects and everyday spaces. *Mobilities* 5(4): 469–484.

Bourdieu P (1991) *Language and Symbolic Power*. Thompson JB (ed.); translated by Raymond G and Adamson M. Cambridge: Polity Press.

Bremser W (2004) [blog post] *Jazz in 2500*. Available at: http://www.harlem.org/itunes/ (consulted November 2008).
Brown S (2008) [blog post] *Taming iTunes for Classical Music*. Available at: http://oakroadsystems.com/genl/itunes.htm (consulted November 2009).
Burkart P (2008) Trends in digital music archiving. *The Information Society* 24(4): 246–250.
Burkart P and McCourt T (2006) *Digital Music Wars: Ownership and Control of the Celestial Jukebox*. Lanham, MD: Rowman & Littlefield.
Campbell DG (2007) The birth of the new web: A Foucauldian reading of the semantic web. *Cataloging & Classification Quarterly* 43(3/4): 9–20.
'CD text' (1996a) CD text specifications announced by licensors Philips and Sony. *Audio Week*, 10 June.
CDDB (1999) [press release] New CDDB(2) service and software development kit announced. *PR Newswire*, 19 July.
Culbertson K (1997) Carmel company ready to mine high-tech entertainment market. *Indianapolis Business Journal*, 10 November: 53.
Dean K (2004) The house that music fans built. *Wired*, 7 July, Available at: http://www.wired.com/entertainment/music/news/2004/07/64033?currentPage=all (consulted October 2007).
Dempsey L and Heery R (1998) Metadata: A current view of practice and issues. *The Journal of Documentation* 54(2): 145–172.
Dodge M and Kitchin R (2009) Software, objects and home space. *Environment and Planning A* 41(6): 1344–1365.
Escient (1998) [press release] Escient acquires preeminent internet music database company CDDB. *Business Wire*, 11 August.
Fry J (2001) Three veterans advise the next tech wave. *Wall Street Journal*, B1.
Garofalo R (1999) From music publishing to mp3: Music and industry in the twentieth century. *American Music* 17(3): 318–353.
Gillespie T (2007) *Wired Shut: Copyright and the Shape of Digital Culture*. Cambridge, MA: MIT Press.
Gracenote (2001a) [press release] Gracenote alleges Roxio breached contract, infringed its patents. *PR Newswire*, 10 May.
Gracenote (2001b) [press release] Gracenote announces music management solution for peer-to-peer networks. *PR Newswire*, 6 November.
Gracenote (2008) [press release] *Gracenote Celebrates 10 year Anniversary*. Available at: http://www.gracenote.com/company_info/press/071508-2/ (consulted May 2009).
Gracenote (2010) [press release] *Gracenote Reaches Global Media Database Milestone*. Available at: http://www.gracenote.com/press/09/09/2010/ (consulted October 2010).
Gray J (2010) *Show Sold Separately: Promos, Spoilers, and Other Media Paratexts*. New York: New York University Press.
Greenberg J (2003a) Metadata and the World Wide Web. In: Drake M (ed.) *Encyclopedia of Library and Information Science*. New York: Marcel Dekker, 1876–1888.
Greenberg J (2003b) Metadata generation: Processes, people and tools. *Bulletin of the American Society for Information Science & Technology* 29(2): 16–19.
Hemos (1999) [blog post] *Escient Trying to Monopolize Market?* Available at: http://slashdot.org/articles/99/03/08/0945228.shtml (consulted September 2009).
Hesmondhalgh D (2010) User-generated content, free labour and the cultural industries. *Ephemera: Theory & Politics in Organization* 10(3/4): 267–384.
Jones S (2000) Music and the Internet. *Popular Music* 19(2): 217–230.
Kan T (2004) *XMCD ChangeLog*. Available at: http://www.amb.org/xmcd/ (consulted May 2009).

Katz M (2004) *Capturing Sound: How Technology has Changed Music*. Berkeley: University of California Press.
Lazzarato M (1996) Immaterial labour. In: Virno P and Hardt M (eds) *Radical Thought in Italy*. Minneapolis: University of Minnesota Press, 133–150.
Lemos R (2001) *Access Denied: Companies Fight Over CD Listings, Leaving the Public Behind*. Available at: http://www.news.com/2009-1023-258109.html (consulted October 2007).
Lessig L (1999) *Code and Other Laws of Cyberspace*. New York: Basic Books.
Lessig L (2004) *Free Culture: How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity*. New York: Penguin Press.
Mathes A (2004) Folksonomies – Cooperative classification and communication through shared metadata. Unpublished Paper. Available at: http://adammathes.com/academic/computer-mediated-communication/folksonomies.html (consulted November 2008).
McCourt T (2005) Collecting music in the digital realm. *Popular Music and Society* 28(2): 249–252.
McCourt T and Burkart P (2003) When creators, corporations and consumers collide: Napster and the development of on-line music distribution. *Media, Culture and Society* 25(3): 333–350.
Mosco V (1996) *The Political Economy of Communication: Rethinking and Renewal*. Thousand Oaks, CA: Sage Publications.
MSNBC (2003) How downloaders are tracked. *MSNBC News*. Available at: http://www.msnbc.msn.com/id/3078421/ns/technology_and_science-games/t/how-downloaders-are-tracked/ (consulted February 2010).
Nilsson M (2006a) *History of ID3 Tags*. Available at: http://www.id3.org/History (consulted June 2009).
Nilsson M (2006b) *ID3 Frames*. Available at: http://www.id3.org/Frames (consulted June 2009).
Palenchar J (2002) Waveform analysis to boost appeal of CDDB database. *TWICE*, 17 June: 38.
Platoni K (2006) Pandora's box: Can a company's musicological data mining breathe new life into the music industry? *East Bay Express*, 11 June. Available at: http://www.eastbayexpress.com/ebx/pandoras-box/Content?oid=1080116 (consulted June 2011).
Pletz J (1998) Escient set to light the afterburners. *Indianapolis Business Journal,* 30: 1, November.
Pohlmann KC (1992) *The Compact Disc Handbook*. Madison, WI: A-R Editions.
Poster M (1990) *The Mode of Information: Poststructuralism and Social Context*. Chicago, IL: University of Chicago Press.
Potts D (2002) ID3 tags demystified. *Australian PC World*, 1 October: 140.
Schiller D (2007) *How to Think About Information*. Urbana: University of Illinois Press.
Singer M (2007) Roll over Beethoven: iTunes' new standard. *CBS News*. Available at: http://www.cbsnews.com/stories/2007/01/09/ces/main2339906.shtml (consulted January 2010).
Sterne J (2006) The mp3 as cultural artifact. *New Media & Society* 8(5): 825–842.
Sterne J (2012) *MP3: The Meaning of a Format*. Durham, NC: Duke University Press.
Straw W (2009) In memoriam: The music CD and its ends. *Design and Culture* 1(1): 79–92.
Swartz A (2002) MusicBrainz: A semantic web service. *IEEE Intelligent Systems* 17: 76–77.
Terranova T (2004) *Network Culture: Politics for the Information Age*. Ann Arbor, MI: Pluto Press.
Théberge P (1997) *Any Sound you can Imagine: Making Music/Consuming Technology*. Hanover, MI: Wesleyan University Press.
Tsioulcas A (2007) Classical retail's new composition. *Billboard*, 12 May (p.36).
Vaidhyanathan S (2003) *Copyrights and Copywrongs: The Rise of Intellectual Property and How it Threatens Creativity*. New York: New York University Press.
Van Buskirk E (2006) Gracenote defends its evolution. *Wired*, 13 November. Available at: http://www.wired.com/entertainment/music/commentary/listening post/2006/11/72105 (consulted June 2007).

van Dijck J (2009) Users like you? Theorizing agency in user-generated content. *Media, Culture & Society* 31(1): 41–58.

Vellucci SL (1999) Metadata for music. *Fontes Artis Musicae* 46(3/4): 205–217.

Whitehead J (2003) [court declaration] Second Declaration of Jonathan Whitehead. RIAA (Plaintiff) v. Verizon (Defendant).

Wilson K (2000) *Escient Tunebase 2000i Music Server*. Available at: http://www.avrev.com/home-theater-feature-articles/best-of-top-100-lists/avrev.coms-best-of-2000-list.html (consulted March 2009).

Jeremy W. Morris is an Assistant Professor in Media and Cultural Studies at the University of Wisconsin-Madison. He is currently working on a postdoctoral fellowship at the University of Ottawa entitled 'You Can Patent That? Technology and the Business of Patents'. His research interests include the state of the popular music industry and the digitization of cultural goods and commodities.