An Ethnographic Study of Music Information Seeking: Implications for the Design of a Music Digital Library

Sally Jo Cunningham
Department of Computer Science
University of Waikato
Hamilton, New Zealand
64-7-838-4402
sallyjo@cs.waikato.ac.nz

Nina Reeves, Matthew Britland
Department of Multimedia and Computing
University of Gloucestershire
Cheltenham, Gloucestershire, UK
44 1242 54326
nreeves@glos.ac.uk,
matthewbritland@hotmail.com

Abstract

At present, music digital library systems are being developed based on anecdotal evidence of user needs, intuitive feelings for user information seeking behavior, and a priori assumptions of typical usage scenarios. Emphasis has been placed on basic research into music document representation, efficient searching, and audio-based searching, rather than on exploring the music information needs or information behavior of a target user group. This paper focuses on eliciting the 'native' music information strategies employed by people searching for popular music (that is, music sought for recreational or enjoyment purposes rather than to support a 'serious' or scientific exploration of some aspect of music). To this end, we conducted an ethnographic study of the searching/browsing techniques employed by people in the researchers' local communities, as they use two common sources of music: the public library and music stores. We argue that the insights provided by this type of study can inform the development of searching/browsing support for music digital libraries.

1. Introduction

At present, research in the international and interdisciplinary music information retrieval (MIR) community emphasizes the development of basic tools for music retrieval—for example, the creation of 'query by humming' (QBH) interfaces that allow users to build a query by humming or singing remembered phrases of the desired song, or the investigation of efficient indexing techniques for music documents. Music digital libraries as reported in the research literature are largely developed as proof-of-concept demonstrations for a given tool or technique, or are focused around an available set of music documents [8]. Current efforts at studying MIR system usability issues focus on user behavior exhibited in specific MIR systems, for example by examining transaction logs [15]. This type of study can tell us what actions people take on an existing system, but give no insight into their motivations, their degree of success or failure in their search, or the information seeking strategies that users employ. And, of course, these quantitative studies are limited to describing usage of existing systems—there is no understanding gained on what additional search facilities, document media, browsing support, etc. that users might desire.

There is a dearth of *a priori* research on information behavior as regards to music—that is, how given groups of people prefer to locate music, the strategies that they employ for searching or browsing, and the ways that they use music once it is located. While investigations of the music behavior of people with little or no formal background in music are particularly uncommon, preliminary studies provide interesting suggestions for search support in a music retrieval system. In [13], for example, participants asked to describe specific classical pieces rarely used formal (bibliographic) terms, but instead used words describing other features not currently supported by MIR systems (most frequently, the emotional impact of the song). Designers of music digital library systems have typically concentrated on development of sophisticated querying systems; particularly QBH systems designed to support known-item searches [2]. In the absence of a rich understanding of user needs and information behaviors, the MIR community runs the risk of developing systems ill-suited to their eventual users.

Earlier work examines the musical attributes people prefer to use in specifying music queries, based on analysis of queries posted to a Usenet newsgroup [2]. The focus here is on eliciting the searching and browsing strategies that people 'natively' employ when looking for music, to add empirical grounding for design decisions in creating music digital libraries. Our context is the search for music for personal use, as would be the case in a

'public' digital library attempting to serve a broad range of users. We do not examine user requirements for digital libraries supporting specialized music information needs, such as those of musicologists, music historians, performers, etc.

This paper presents results from an ethnographic study of user information behavior in the context of two popular sources of music: the public library and music CD shops. Even with the advent of Internet-based music services such as Napster, Kazaa, Morpheus, and other music sharing services, shops and libraries continue to be commonly used by many people when they search for music. Behavior in these physical environments is also more amenable to observation than actions taken in virtual music retrieval systems; in the shops and public libraries we were able to literally step back and gain a broad view of how relatively large numbers of people searched and browsed for music, and how these shoppers interacted with each other.

Our focus on CD shops and the recorded music section of libraries necessarily restricts our investigation to music behavior as regards to the types of musical document available in those locations: namely, recordings (mainly CDs) of albums and single songs. To our participants, 'looking for music' in CD shops primarily means trying to locate a particular album or single (a known item search), or to locate/identify CDs containing music that the participant might enjoy listening to (generally accomplished by browsing, as discussed in Section 4.3). Eliciting details on other types of music information desired by potential MIR system users (for example, song lyrics or musical scores) or the resolution of other types of music problems (for example, the identification of a song title from a remembered fragment of a chorus) must be accomplished in the context of systems that better support delivery of those types of music information (such as the analysis of Usenet music queries in [2]). The strength of the approach presented in this paper is that it allows researchers to examine searching and browsing behavior, to flesh out results from previous studies of music queries (which focus on information needs rather than searching/browsing strategies).

2. Methodology

The data gathering techniques employed in this study are individual semi-structured interviews, focus group sessions, and participant observations set in CD stores and the music sections of public libraries. Since observed information behavior was similar in both the public libraries and in the CD stores, in the discussions below the term 'shopper' will be used to refer to patrons of both types of music sources.

The shopping observations were intended as opportunities to study 'natural' music searching and browsing activities, and as such were conducted as anonymous 'public space' observations—that is, the researcher mingled with groups of music shoppers and unobtrusively took notes on the shoppers' activities. Since different shops may be aimed at different sectors of the public, and demographics of a crowd of shoppers may change depending on day of week and time of day, the sites and times for observations were varied in an attempt to gain a picture of music browsing and searching for as wide a variety of people as possible. At present, approximately fifteen hours of observations have been conducted in eight different music shops and in the music section of two public libraries, in New Zealand and in England.

Our objective was to explore the information seeking practices embodied in music shopping activity, rather than to follow the more common market research tactics of determining predictive factors for purchasing behavior. We therefore focus on how shoppers locate music CDs, rather than the (often fascinating) factors involved in deciding whether or not to purchase the CDs that are located. This approach means that we do not consider the effectiveness of commercial strategies such as aisle displays or sale pricing to encourage 'retrieval' (purchasing) of specific music items.

These anonymous observations are a rich source of 'what' data—the actions that people take—but they are impoverished sources of 'why' and 'how' data (the motivations behind actions, the goals of activities and the strategies employed to reach those goals). A second type of participant observation was performed, in which the researchers accompanied shoppers who agreed to use the think-aloud protocol to describe their actions. Five people have participated in this type of observation.

Interviews and a focus group session were conducted to provide contextual information for behaviors observed in the shopping observations. At present eight adults and one child have been interviewed about their music shopping strategies, their preferred sources for music and information about music, the ways that they typically 'use' music, and social contexts for locating music. Interview participants commented on how they locate music both in physical stores and by using the Internet/World Wide Web. These interviews were semi-structured; participants were encouraged to expand upon the topics raised by the questions (see Appendix). The four-member focus group discussed strategies for locating music both in physical and online CD shops, the types of music metadata or additional information that may be required to confirm interest in a particular CD or song,

and recreational aspects of music shopping. Accompanied shoppers, interview participants and members of the focus group were self-selected from acquaintances and members of the university community who were made aware of this study either through advertising for participants or by word of mouth.

Data from all sources was analyzed using a grounded theory approach [9]. With this technique researchers attempt to approach the data without prior assumptions, and to generate theory from the data. Further qualitative studies or quantitative experiments can then test the validity of the emergent theory.

3. Demographics

The ages of interview participants, focus group members, and accompanied 'think-aloud' shoppers ranged from the early 20s to the mid 30s. Additionally, a ten-year-old girl was given a shortened version of the interview questionnaire. Three of the seven interview participants were female; three of the four accompanied shoppers were male; and the four-member focus group was evenly divided into two males and two females.

Given that the participant observations of music CD shops were anonymous, we were unable to accurately assess demographic data for this portion of the study. The shoppers appeared to be drawn from across the spectrum of society, however; ages ranged from very young children to the elderly, and music shopping appeared to be an appealing activity for all ethnic groups.

Interestingly, we observed significant numbers of men shopping for CDs—easily half of the shoppers in most stores were male. This is a relatively unusual situation with most shopping studies, as historically, 'the vast majority of the world's shoppers have been women' [19]. Female domination of shopping, and particularly recreational shopping, has been the case in the Western world for over 300 years. With the development of modern-style malls and department stores in the 19th century the majority of shop assistants were also female (though not, of course, the less-visible store managers). Shops and shopping were feminized to such an extent that the female attendants at the large Marshall Field department store giggled scornfully at the 'Molly Husbands' who accompanied their wives to the store [14]. Music shopping is, in fact, one of the very few shopping activities in the Western world that men engage in to the same extent as women [5], and so music shops are constructed to be relatively gender-neutral places— allowing us to assume that shopping observations are a reasonable source of information of music information behavior for both sexes.

The age range of the shoppers whom we observed appeared to be skewed towards the younger end of society, as might be expected given that people under thirty tend to spend more money on music CDs. CD stores generally target that age group in both the store décor and in the available music selection. For example, one store had a small 'oldies' section where the CDs ranged from Victorian melodies to Benny Goodman to Lou Reed. Older shoppers (those apparently aged sixty or above) appeared to feel less comfortable looking for music in CD stores; they often hesitated in the entranceway and looked momentarily disoriented as they tried to take in the bright lights, the large posters of chart topping musicians, and loud contemporary music. If music information seeking strategies vary by age group— and we have no evidence either way on this question— then the results presented below will be most valid for younger people.

4. Observed music behavior

The following sub-sections describe the searching and browsing strategies displayed by music shoppers and public library patrons. As no difference was detected between music seeking behaviors in the shops and the libraries, for readability's sake the discussion below refers to all observations as being of 'shoppers', no matter the location. The ethnographic methodology is best suited to exploratory studies such as this, where the goal is to create as comprehensive a catalog as possible of music-related information behaviors. Further research is required to determine the relative importance of these strategies, the pre-conditions for employing each strategy, etc.

4.1. Searching and browsing are interleaved

Consider the following pattern of shopping behavior, commonly observed in CD stores:

The shopper enters the store, and is attracted to a colorful display of chart-toppers or sale items near the entranceway. She briefly scans these CDs, perhaps picking one or two up to examine the tracklist on the back. Next, the shopper goes directly to the racks marked Jazz—her favorite type of music. She's looking for a particular CD that a friend has recommended, and she searches for that artist in the alphabetized rack [*searching*]. She finds the CD, reads the tracklist on the back, and then decides to purchase it. There's a sales table nearby marked '50% off' that grabs her attention, and she spends a few minutes looking

IEEE
COMPUTER
SOCIETY

through the assortment of bargains. Some CDs are piled haphazardly, and she doesn't bother looking through an entire stack; instead, she glances only at the top layer of CDs, picking up the occasional one with a colorful or interesting cover. Some sit spine-up and she flicks through them, but there is no logic to the arrangement and so she loses interest [*browsing*]. As she goes to pay, she stops by the 'Oldies' section—another type of music that she enjoys—and flips through a few of the CDs on display [*browsing*]. That reminds her that she wanted a copy of an old Rolling Stones album, so she goes to the Rs of the Oldies section [*searching*], finds the album, but decides not to buy it at that time. She then walks to the checkout and purchases the Jazz CD.

Specific searching and browsing behaviors are analyzed in Sections 4.2 – 4.8. Here, the interesting point is how casually searching and browsing can be interleaved—that a known-item search can quickly be followed by relatively directionless browsing (for example, trying to find 'something interesting' on the sales table), and that browsing can inspire the formulation of a search (when the shoppers abandons browsing the Oldies to locate a specific CD).

Current music retrieval systems generally strictly differentiate between searching and browsing, forcing users to choose to engage in one or the other (indeed, if they support browsing at all). Moving between the two activities may be awkward or disorienting, making it difficult to maintain a sense of direction of focus. One focus group participant described the ability to browse as a facility supported in shops, but not in the music resources that he consults on the WWW: "You also can't choose random CDs, which I suppose is the advantage of shops as you can just search at random." In the Greenstone-based MELDEX [1] music retrieval system, for example, the browse and search screens are functionally separated—it is not possible, for example, to locate an interesting song and then directly move to browsing a list of other songs in that genre. Clearly, however, music seekers would benefit from an interface that would allow them to move seamlessly between the two information seeking behaviors.

4.2. Known-item searches are conducted

Observations and interviews confirm that people conduct known-item searches for music—that is, they look for a specific music document, basing their search on known features of the document. Features guiding the search were bibliographic (primarily artist/group name,

album name, and song title), indicating the importance of including quality bibliographic data in a music digital library.

As with any search based on bibliographic details, at times people have difficulty in accurately or effectively conducting the search; the shopper might not know, or may not remember correctly, some of the descriptive information for the desired item. One interview participant commented on a frequent frustration of hers with searching for music online: "I have a lot of trouble looking up a song and I don't know who sang it. They really need to come up with a better way for people to look up music if they know a few words of the song."

In this latter case, the interviewee had been attempting to look up a song online; she was unaware of lyric servers, and had certainly never heard of QBH systems (which, at present, are not common). While research articles describing query-by-humming interfaces frequently cite anecdotal evidence that music-seekers "often hum or whistle a phrase of music and ask them [search facilitators] to identify the corresponding musical work" [21], no such behavior was observed. Interview participants professed a reluctance to approach either librarians or music shop workers with queries (sung or spoken); this point is further discussed in Section 4.7.

Intuitively, it seems likely that QBH systems would be popular, but little hard evidence exists to confirm this conjecture. When the idea of a QBH system was described to focus group participants, they were enthusiastic about the possibility of using this type of interface:

Participant 3: That would be great as half the time I don't know what the song is called or who it was by. However I often know the lyrics or how the tune goes.

Participant 4: Yes I agree, I think lots of people are like that.

Participant 1: It would certainly make searching a lot easier.

Taken together, evidence from observations and the focus groups suggest that while the current incidence of sung queries may not be as common as is suggested in the QBH literature, a QBH interface might be welcomed, as users could avoid the discomfiture involved in singing in the hearing of a shop clerk or a reference librarian.

Once a CD is located, the shopper must confirm that this is indeed the particular music that was desired. As suggested in the scenario presented in Section 4.2, at this point the tracklist on the back of the CD is often

consulted. In compilation albums, the shopper may wish to determine whether the original artists perform the songs: one accompanied shopper was concerned that a CD might "be a 'sounds like', not a proper album". More generally, the shopper is attempting to ensure that these are the correct songs: "The titles—are they familiar to me, can I hear the song in my head?"

The ability to listen to song clips would support a more natural way for users to verify that the right song has been located than does forcing them to rely solely on text-based metadata. While an online music retrieval system will presumably have song files available, the user might not wish to take time to download the entire song or album in order to verify that it is the desired item—or a commercial music library might not make the entirety of a song available without payment. Clips may also provide a means for aurally scanning a list of search hits, in much the same way that most search engines return brief extracts from text documents.

4.3. Browsing is a significant activity

The anthropological research literature on shopping draws the distinction between 'shopping for' (searching for specific, required items) and 'shopping around' (non-directed shopping that includes recreational or pleasurable elements) [5]. Music shopping is primarily 'shopping around', and as such frequently incorporates aspects of information browsing into the shopping activity. Browsing involves a semi-structured investigation of an information resource [4]; it is differentiated from searching in that browsing is more exploratory and less directed. Music shoppers browse the contents of a shop or public library mainly by genre; typically music is grouped into broad categories (rap, pop and rock, oldies, etc.) and then further subdivided by artist, and shoppers scan only those categories that appear likely to have music that the shoppers enjoy. The genres do not have to be tightly defined—shoppers are often willing to spend significant amounts of time flipping through a category of interest, and this type of browsing also supports the monitoring strategy (Section 4.5).

Shoppers appreciate stores whose genre categorizations correspond to their personal view of which artists or compilations are 'like' each other. One interview participant mentioned a store in which she particularly enjoyed browsing. When asked what she liked about that store's CD arrangement, she replied that it seemed to fit well with her view of a 'natural' clustering of music:

"The CDs seem to clump into era/genre groups. You'll find Fleetwood Mac and Bruce Springsteen and Carole King all reasonably close to each other. If I go for something from that kind of era, genre, what I call real music as opposed to the candy floss we get now, they're all together, so you might find something new that way. Trance music is together, you can go 'I know that song and that song, they're on the same CD here'. I can bypass the stuff I don't like. I don't like ethnic and classical … and so I can avoid them."

The diffuse boundary between different genres makes problematic the assignment of a single classification to a given work of music. This is a problem that the CD store shares with the physical library, in that a CD is an object that can be displayed in only one location in the store, no matter how many different genres that it might possibly belong to, or no matter how many different genres that individual shoppers may think of it as belonging to: "I have trouble finding things sometimes, sometimes a group or person can fit into more than one category. [Q: Can you give an example?] Pop music can be alternative or easy listening sometimes, or hard rock, or rap, it can be any of those things."

Pachet and Cazaly note that while genre categorization is desirable, the development of a generally acceptable genre classification scheme is not a straightforward process:

> 'Good' genre groupings appear to be appealing to browsers, although the construction of genre categories and taxonomies is problematic, to say the least. The most extensive genre classification schemes have been constructed by commercial music providers or retailers, and these have been structured to meet the needs of the recording industry. These taxonomies of genres exhibit inconsistencies between each other in naming and definition of genres as well as in scheme structure (depth and organization of the classification tree), and individual schemes include semantic and logical inconsistencies [16].

At this point, we argue that any attempt to support genre browsing should be based on a deep understanding of how the potential users of a MIR system define, perceive, and describe genre. Attempts to correct the perceived inadequacies of commercial genre taxonomies by appealing to 'objective' design principles can lead to classification schemes that may be less usable in practice: for example, the taxonomy developed by [16] includes features that even the authors describe as 'surprising', such as the elimination of Rap as a genre. This situation arose by defining Rap as "more a diction type than an

actual stylistic specificity"—a decision which is indeed logically dictated by the construction rules of this particular scheme, but which surely would surprise and confuse the hordes of teenaged males that we observed converging on the Rap sections of CD stores!

Similarly, Fabbri [6] observes that these commercial genre taxonomies frequently fail to clearly differentiate between musical style and genres proper—a confusion which appears to be acceptable to lay users, though not to musicologists. We concur that usability and conformance to user understandings of the music world are paramount: "the point here is classification *per se*, not according to what principles or parameters." [6]

Further, the development of authoritative, completely consistent and logical genre taxonomy may be counter-productive. People generally find it difficult to clearly differentiate one genre from another (the classic example is the diffuse boundary between the Pop and Rock genres) or to infer the (generally implicitly defined) definitions of genres. This latter problem is particularly difficult to overcome when the user is faced with an unfamiliar genre label. For example, is 'Zouk' a different name for a type of music already familiar to the user, an existing type of music that the user has genuinely never encountered before, or an emerging genre? What sort of definition could allow a user to determine which case holds, and to decide whether or not s/he will like this music?

When asked to provide definitions for named genres, people are often unable to express clear rules for constructing example pieces in that genre or to precisely delimit the boundary between proximal genres. As Fabbri notes:

> In our cognitive experience, we recognize types of phenomena according to partial descriptions, to truncated knowledge. Curiously, but truthfully, genre appears to be a less specific concept than style: … we know how to recognize instantly a few genres (even without listening to any music), though we would not be able to give someone else a set of instructions to carry out that recognition. We would rather point at prototypes, at 'best examples', as interpretants of our own, private cognitive type. Genres are more about beliefs and practice than about theory. [6]

Indeed, in describing an enjoyable type of music, the reaction is often to give the genre a label (if possible) and then to name an artist, album, or song that the individual considers to be an exemplar of that genre. For example, one interview participant mentioned exercising to what she called 'gym music', and provided the exemplar of Kylie Minogue's 'Can't Get You Out of My Head'.

People may also develop their own, idiosyncratic categories, such as 'gym music' or 'study music', or group music by its emotional impact ('depressing'). Since the construction of these novel categories involves mentally grouping familiar songs, the individual has at hand examples of songs falling within the novel genre; locating new songs in an idiosyncratic genre could be supported by search tools that allow the user to ask for 'more songs like these'. A next step is to clearly identify the musical facets most useful for characterizing genres—timbre, instrumentation, rhythm, etc—and to develop interfaces for specifying musical query-by-example searches.

Consider, for example, an interview participant describing the type of music that he selected to listen to as he wrote his thesis: "It's sort of like progressive rock music. It wasn't too heavy or violent, doesn't break concentration much, and I think it's good music." The desired works were a selection from (or possibly an idiosyncratically defined sub-genre of) the commonly known genre "progressive rock", with the caveat that the songs do not convey the emotional tone of "heaviness" or "violence", that the songs allow the student to focus on the task at hand rather than attending to the lyrics or melody, and also, perhaps most importantly, that "I think it's good music."

And of course, 'good music' is what people are really looking for. The idiosyncratic nature of what constitutes "good music"—or even simply music itself—cannot be overstated. As one interview participant observed, "To person A, the car goes by and you hear 'boomph, boomph, boomph'. To me, in my humble opinion, they might as well have recorded a milking machine."

4.4. Shopping is often collaborative

Music shopping is often not a solitary task—people frequently entered the CD shops in groups, and proceeded to work together (to a greater or lesser extent) in browsing and searching the store. The observed group sizes ranged from two to seven people, and varied greatly in their composition: one or more parents with children; romantic couples; groups of teenaged males or females; mixed gender groups of university-aged students; several sets of couples; and so forth.

Group shopping is not generally the task-oriented, directional shopping associated with 'shopping for', unless the shoppers are, for example, all searching for a gift for someone else. Instead, group music shopping is usually 'shopping around', a relatively directionless activity that allows the shoppers to spend time together and to affirm their relationships by demonstrating their

knowledge of each others' tastes, styles, and interests [17].

The majority of the groups of shoppers observed during the participant observation study did not appear to have made the trip to the mall or shopping area with the sole purpose of shopping together for music. Instead, usually they appeared to take in the CD stores as a side trip on a larger shopping excursion; the group might, for example, 'drift' into a CD shop for a few minutes as they walk down the street together, then drift out and continue down the road. Interviews supported the collegial, unplanned nature of much music shopping: "Yeah, if I'm going to town I'll normally go with my flatmate. I don't normally go out just to look around [that is, make a special trip solely to visit a CD store]. If I'm walking around a mall I might go in [to a CD store]." This participant further noted that browsing in a shop has "more to do with having the time than motivation." Another interviewee emphasized the place that shopping, and particularly music shopping, plays in maintaining relationships among her circle of friends: "I go shopping with friends occasionally, if the friend is there and there's nothing else to do. I go with whoever is around, male or female."

If musical preferences are often highly individual and strongly felt, then surely demonstrating an understanding of another's musical likes and dislikes indicates a bond with that person, and sharing those tastes confirms a still stronger tie. This sort of bonding can occur even in relatively casual relationships. For example, one of the authors displayed an interest in a particular CD on an accompanied shopping trip; the shopper then immediately added to his browsing a search for things that might interest her, with his understanding of her tastes based on the artist that she identified, and the era and genre associated with the artist. Ties between two people can be demonstrated through music shopping even if only one person is present. Shopping for a CD to be given as a gift for an absent friend or relative clearly demonstrates both a bond and an understanding of that person's interests; one interview participant, whose musical interests are both arcane and specialized, noted that "if you collect anything, as soon as people know, they bring things to you."

Romantic couples provided the most striking example of the use of collaborative music browsing to affirm or strengthen a relationship. These pairs wander arm in arm through the store; when one picks up a CD, the other holds it as well, and they read the tracklist together and discuss the CD before returning it to the rack and moving along to the next item of mutual interest. For these shoppers, browsing the CD stores appeared to be a courtship ritual, as their identical tastes and opinions affirm their 'couplehood'.

It will be difficult for a virtual digital library to match the rich collaborative browsing environment afforded by the physical CD store. In stores, friends can impulsively decide to indulge in music shopping, quickly share 'finds' with each other both orally and visually (by holding up a CD or passing it from one person to another), and just as casually end the excursion. Synchronizing collaborative sessions online may be a more bothersome task than simply zipping into a store as friends stroll down a street—although facilities such as instant messaging or chat rooms may provide promising ways to add spontaneity to collaborative exploration of digital libraries.

More formally constituted online 'interest communities', as described in [12], may also provide online meeting places for music digital library users. In this case, on online resource dedicated to a particular artist (John Prine) included an online chat room in which Prine devotees discussed the artist and his music. These communities require careful nurturing and constant monitoring, however, to maintain focus in the online discussions and to preserve an open, social atmosphere.

Interview and focus group participants also expressed an appreciation of more impersonal venues for feedback from other people, specifically mentioning chart sales, reviews (written by both fans and professional reviewers), and online lists of CDs purchased by other shoppers. The most useful information gives insight into the preferences and recommendations of others. Relative sales rankings give broad impressions of what is currently 'hot': "The chart section is always a good place to look as it shows what other people have bought." Some interviewees and focus group participants valued indications of other peoples' purchasing patterns, such as Amazon's 'customers who bought this title also bought' listings:

Q: Does that make you want to buy the other CDs more?

Participant 4: It certainly makes it more of a possibility, as I may have similar tastes to those people.

Opinions on the usefulness of reviews were mixed. No interview participant reported regularly reading professionally written music reviews; one stated that that is something "real fans" do, and none of these participants strongly identified with any single musical genre to the extent of becoming a 'fan'. Shoppers occasionally glanced at the reviews of CDs on display near listening posts, but very few were observed reading them with any degree of thoroughness—users of the listening posts generally preferred to gaze around the store rather than to focus on written material. Reviews written by non-professionals were more favorably

received. One interview participant preferred these to formal reviews, as the other music lovers tended to describe CDs using the same sort of terms and attributes that he himself would employ. Three of the four focus group participants found reviews by other customers or music fans to be useful:

Q: Do online reviews help you choose music?

Participants 4, 3, 2: Definitely.

Participant 4: If someone has said they are good, it would definitely influence me to buy them and vice versa. As if they are a reviewer they must know what they are talking about.

Participant 1: I disagree it doesn't really make a difference to me, I like to make up my own mind. Everyone has their own opinion on what is good or bad.

On balance, it would appear that facilities providing support for users to annotate music documents with ratings and reviews could be useful in a music digital library.

4.5. The 'Journal Run' strategy is useful

As shoppers browse, they may identify a section of the store that appears likely to contain an item of interest. Desultory, seemingly random flipping of a few scattered stacks of CDs quickly switches to methodical examination of each CD in the area; typically, the shopper works row by row, rack by rack, flicking through to expose the covers to view the album title and artist. These shoppers are adopting the 'extraction' information seeking strategy, commonly known in academia as the 'journal run': they are systematically working through a particular group of CDs in order to identify material of interest, much as researchers engaged in a literature search may examine a series of issues from a journal one by one in hopes of locating a useful research article. [4].

Shoppers appreciate displays in which the CD spines or covers are easily viewable, and the CDs are alphabetically ordered. A common complaint of accompanied shoppers was that the sales CDs tended to be haphazardly stacked: "Unfortunately they're not in alphabetical order, so I have to go through the whole damn thing." One accompanied shopper explained that she likes the display racks in a particular store because the labels on the sections are labeled with group names, not just letters of the alphabet.

Other information on the CD cover or spine may be quickly consulted. In Section 4.7, we discuss cover art in detail, and in Section 4.2 we describe the examination of back-cover tracklists by shoppers. Other less formal bits of information may be useful in focusing interest in a CD:

Participant 3: Yes sometimes say if it has limited edition on the front or a warning it may attract me.

Participant 4: Also if it says it has a free poster inside and things like that it may encourage me to buy it.

At times, however, more details are required to make an informed decision about a potential purchase than is available on the cover, and the shopper may wish to consult the CD's liner notes. Frustratingly, this is often not possible: a focus group participant complained that, "Sometimes I want to look inside the CD cover but most of the shops seal them so you cannot open them up." What sort of information are these shoppers hoping to find? Anything that can help them to ensure that they have correctly identified this CD, and that can assist them in deciding whether or not they will enjoy this collection of songs: "The lyrics…do they have the words to the song. Anything biographical about the artist, what was inspirational to him, when it was written, where it was recorded."

As with any information resource, is not possible to determine *a priori* what particular items of information/data are likely to appeal to users, or to predict all possible uses to which the music may be put. A musicologist's information needs in a music digital library, for example, are likely to differ dramatically from those of a mother seeking good children's songs to play on a long car journey. A collection developer can only attempt to present all types of data available about the collection contents. As one focus group participant emphatically responded, "Basically the more information the better." An alphabetic sorting for browsing, based on artist, appears essential. One interview participant pointed out the potential usefulness of sorting by release date, either as a secondary or primary sort, as music lovers may have a good 'feel' for when various CDs were released.

4.6. Keeping up to date

The stock for sale in a music store changes constantly—new CDs are released, old music is re-released, CDs sell out and more copies are brought in. Shoppers keep up to date on the music available for sale through the *monitoring* information seeking strategy [4]:

they peruse the store displays just to stay current on the locally obtainable offerings.

At present it can be surprisingly difficult to effectively pursue the monitoring strategy in a CD store, unless one is concerned only with top-selling works:

> Participant 1: It would help when shopping for someone or even if you were shopping for yourself if the shops had release dates up, so you knew when things came out.
>
> Participant 2: They do I think, but it is usually very limited to popular releases.

It can also be difficult to determine whether a given CD has not yet been released, been released and not yet reached this store, or was stocked by the store but sold out. An accompanied shopper searched in vain for a Norah Jones CD under the 'Jones' label in three different genres, only to learn from the sales clerk that it had sold out: "Shouldn't there have been a sign up in the Jones', saying Sold Out, when I was jonesing back there?"

It is trite to note at this point that the music world is exceptionally diverse, and that the popular music scene is highly eventful. Monitoring of all current music activity is hardly possible solely through the auspices of a single digital library; the focus must be on providing links to outside music information resources—current event descriptions, music reviews, chart lists, etc. Monitoring support for the contents of a given music digital library should be more straightforward to provide—for example, through "what's new in this collection" summaries that could be subdivided by genre as well as date (so that the user does not have to scan every section of the library to find music that is of interest).

4.7. Music shopping is surprisingly visual

Originally album covers featured simple designs, with color usage limited by printing techniques and graphics limited to relatively simple drawn or stenciled images. New printing technologies introduced after World War II allowed black and white photographs (and later color images) to be reproduced cheaply and with good definition. These technological changes allowed album producers to enhance the attractiveness of their offerings. Some record companies quickly developed distinctive cover appearances; for example, Blue Note used blue motifs on nearly all of the albums produced under that label. Musical genres also came to be represented with distinctive cover styles and cover images; frequently the images were associated with the individual musicians or the popular associations with that type of music. For example, in the late '40s and 1950s the unsmiling photographs of Blues artists allowed those albums to easily be distinguished from Swing albums, which invariably featured widely grinning, exuberant band members. The general effect of Blues albums also often reflected the melancholy, erotic, and risqué nature of the music itself [20].

Today's music shoppers can generally recognize the cover style of music genres that they enjoy, and cover appearance plays a part in browsing and searching for music. Although one interview participant discounted the idea that cover styles can be reliably distinguished ("I don't think you can read too much into that"), others quite clearly used the cover art to gain clues about how the music would be likely to sound: one shopper, confused by an unfamiliar cover style, held the CD up to one of the authors and asked, 'What would this sound like?' Some interviewees felt that they were able to use a CD's appearance to make quite sophisticated inferences about the music that it is likely to contain:

> [Question: *Can you recognize different artists or types of music by the CD cover art?*] " Within reason. Some people slap a weird cover on something, but mostly you can tell whether something is heavy metal or soft rock or pop. Trance music all has the same type of cover: a weird computer generated shape with a list of artists down the front. Expensive trance music comes in a cardboard box that takes 10 minutes to dismantle it to find out what's on the CD. The coolest ever cover is [garbled], they put out a cover with all clear plastic overlays with body parts on the CD cover, there's no writing on it. You can't tell from the CD or CD cover what the hell is on the CD, you might put it in mistaking it for a medical database."

This interviewee goes on to add that it is not always straightforward to deduce genre from the CD cover art: "Some people do gratuitous things with CD covers just to confuse you." Another participant noted that some motifs or styles may be common to more than one genre representation, even though the genres themselves may be quite different: during an accompanied shopping excursion she picked up a CD with a picture of a castle and 'lots of greenery', but quickly returned it to the rack, noting that: "Covers with old world style catch my attention, they might be Celtic music—this isn't, it's U2!"

The images on CD covers are used by shoppers in a variety of ways: to speed searches through a large stack of CDs, as the shopper quickly flicks through the stack searching for a desired CD; to scan distant stacks for interesting images; to provide guidance on the genre of

music by an unfamiliar artist; and to quickly indicate to wandering companions when an interesting CD has been located (by holding up the CD for the companion to see).

Some browsers deliberately focus on cover art as a way of quickly identifying a given CD: when one shopper was asked why he was intently looking at a CD that he was not going to purchase on that particular shopping excursion, he responded that he wanted "to remember what it looks like, to make it easier to recognize if I haven't seen it before" (that is, in future browsing he will know whether or not he has previously considered this particular CD).

CD cover art provides a useful communication tool for collaborative browsing during group shopping excursions: in one observation of two shoppers, the pair held up a CD to ask, "have you seen this?" three times in thirty minutes. Later as the two left the store Shopper 1 wanted to ask questions about a CD that Shopper 2 had recommended, but Shopper 1 couldn't remember the CD's title. When Shopper 1 described it as, "the one that looks like a paint sample", Shopper 2 immediately recognized which CD that Shopper 1 wanted to discuss.

Individual CD covers can be highly memorable, and as such can be useful in locating older, familiar music. One participant explained that when he was younger he didn't know much about music, but "I used to go through the albums at the public library as a kid, now sometimes I see a CD with a cover from an album [I saw] as a kid, and now they're old, and cheaper. Sometimes I buy an album I saw as a kid…" This selection is made because the cover art jogs memories of the music that he listened to years before. The covers of new, high sales CDs are often also familiar; this participant noted that for contemporary music, 'often I know what the album looks like from the TV ads.'

As mentioned in Section 3, music shopping and browsing is an activity that people of all ages participate in. Young children were frequently observed browsing through the CD shops and the public library CD section, of course often accompanied by an adult or older sibling. The children tended to browse independently of their 'minders', and to have musical tastes that ranged far beyond the small Children's Music section of the stores. Children appear to browse almost entirely by recognition of CD covers—and even the very young are sometimes able to recognize relatively large numbers of contemporary artists and current chart-topping CDs. One observation highlighted this point:

Girl, age 4, comes rushing into the store, straight to the Top Ten rack closest to entry. Her 3-year-old niece is close behind. The 4-year-old immediately grabs a CD and tells the 3-year-old they want it. The 3-year-old points to two other

CDs they want. The 4-year-old takes the CD back to the entry, where Mother (who is also grandmother of the 3-year-old) is entering the store: 'Mum! I want this!' She pulls Mother into the store and over to the Top Ten rack. The 3-year-old, 'And this one!' They are very excited. The Mother and I are laughing; I ask whether they actually know what the CDs are. Yes, they do! Mother demonstrates by asking them who the artist is for the CDs they've chosen and for other CDs. The Shrek [animated movie soundtrack] CD is easy to identify, but the girls know them all. Mother: 'Nelly Furtado, I didn't even know about this one, they told me about her.' The kids know the CDs by cover image. Mother confirms that the girls definitely can't read.

The relatively small size of the CD in relation to LP vinyl albums is one limiting factor in the use of CD cover art in browsing. One participant notes that, "The 'CDs don't cut it, the album cover is better, there's something about that [the vinyl album] size.' However, despite their small size, the covers may be immediately recognizable from a distance: "I'll quite often spot something across the store and go ooh ooh ooh."

CD shops exploit cover art to draw shoppers into the store, by presenting racks of current chart-topping CDs in the entranceway. It is striking to watch people walk briskly up to a store, slow as they scan the entranceway rack, then stop to examine a particular CD. A quick glance inside the store is often rewarded by the sight of another interesting CD display, and the shopper makes a brief, unplanned foray into the shop to browse. As noted above, in some cases the shopper's eye is caught by a cover that is already familiar; in other cases, a distinctive cover may pique a shopper's interest enough to pick up the CD to learn more about it: one shopper, for example, explained that she pulled a particular CD from a large rack for close examination because "This is a cool cover, picturesque".

The utility of the CD cover images lie in their familiarity (from advertising and from sightings in previous shopping trips), and in the existence of design conventions for different genres; it is important, then, that any images used in a music digital library be similarly recognizable and well-known to users. Images could be used as thumbnails accompanying search hits or browsing displays, to support fast scanning for items or genres of interest.

4.8. Sales staff may be intimidating

The sales staff of a CD store provide services analogous to those provided by reference librarians in a physical library: they help the shopper to locate items that are proving difficult to find. Customers are sometimes reluctant to approach sales staff with more general questions about the availability or location of CDs, however. This phenomenon has also been noted in physical libraries, where patrons may be reluctant to approach reference staff; for example, Maori [native New Zealand] students find it particularly difficult to ask questions of the library staff. In this case, the students are intimidated by their perception of the relative differences in status, age, race, and extent of the sense of 'belonging' to the library environment [3].

In both the library and the CD store, this reluctance to ask for help appears to be grounded in what Goffman terms "impression management"—an avoidance of situations that the shopper feels may cause embarrassment, by making the shopper appear cheap, foolish, or ill-informed [10]. In this situation, embarrassment may occur because the shopper may be exposed as being ignorant relative to the presumed expertise of the staff member, or because the shopper may be expressing an interest in music considered unfashionable or of inferior quality. One interviewee was particularly scathing about how she disliked having to "put up with pretentious a-holes behind the counter who if you ask [for a particular album] say 'I don't know if you're cool enough to talk to'".

Although some members of the focus groups mentioned the sales staff as an obvious first step for locating an CD or genre of interest if they could not be quickly spotted in the store, evidence emerged from the participant observations that many shoppers appeared diffident about approaching the sales counters: the shoppers would come near the clerks, retreat, then return to ask their question. An interview participant confirmed that for her, asking the staff for help was a last resort: "If I really, really want it I will, otherwise I don't. It depends on how mean looking they are."

Impression management also influences the willingness of shoppers to ask CD store staff to play a particular CD on one of the store 'listening posts' (stations set up with a CD player and a headset). While shoppers sometimes wish to listen to samples from a CD before making a purchasing decision, many dislike asking to listen to the song in-store (one shopper commented, "I hate making a fuss"). In the stores where our observations took place, the posts that play shopper-selected music are generally very close to the sales counter, and so listening at these posts effectively puts the shopper on display to the rest of the store and in close proximity to the queue of purchasers—a location that may feel awkward and uncomfortable.

Additionally, the price of a CD may affect the shopper's willingness to listen it in-store. One shopper commented that "I feel guilty not buying it if I listen to it", and so listening to a new release might lead to an expensive purchase. This shopper felt that listening to a bargain bin CD held even greater potential for embarrassment, as he felt that he would appear cheap if he then decided not to buy it—or that he would look foolish even if he made the purchase, because he had to listen to an inexpensive CD to decide whether or not to buy it. Instead, he usually bases these purchase decisions on liner notes and inferences on style and genre based on the cover art: "I have bought a lot of stuff [from the bargain bin] on a punt, [thinking] 'I should like this'."

The presence of sound clips for many of the CDs available at Amazon.com was noted by two interviewees as a welcome alternative to CD store listening posts: "If I ever do feel like finding out how the songs on an album sound, I go over to Amazon and listen to the sound clips they have." The anonymity in previewing music afforded by a music digital library would probably prove welcome.

Many shops contain additional listening posts that play only featured CDs, although the listener can switch between tracks. These may be more or less useful to a shopper in browsing or making a purchase decision, depending on whether or not the shopper happens to be interested in the type of music currently installed on the posts; one focus group participant dismissed the selections at this type of post: "The listening posts in [Store X] and similar shops are usually rubbish, they very rarely have what you want." Observations indicate that other shoppers may find the store selections appealing, as they listen at the posts for times ranging from a few seconds to nearly 20 minutes. Pairs of shoppers may trade a headset back and forth as they discuss a song—particularly teenaged girls or romantic couples. The posts see particularly heavy use by one group of shoppers: those in their early teens or younger, who often flit from post to post until they find a song that they particularly enjoy. The 10-year-old interviewee commented that, "Since I'm only 10 and can't afford to buy, usually what I'll do is put the headphones on and press replay about 50 times."

5. Summary

This study suggests that findings from studies of music information behavior, as displayed in setting such as music stores and public libraries, can be used to inform the design of useful and usable music digital libraries. We have identified behaviors that are not well supported by current MIR systems, for example the 'journal run' strategy. Some of these potentially useful

features could be easily incorporated into existing MIR software—such as the suggested ability to sort search results by release date. Perhaps one explanation for the absence of these technically simple features is that many MIR systems have been developed in academia are developed as proof of concept prototypes, with the focus on demonstrating the effectiveness or potential of advanced features such as QBH.

Support for some music information behaviors may be achieved by borrowing from related techniques supporting exploration of textual or visual documents. For example, consider the comment of the focus group participant who critiqued the relative difficulty of browsing in MIR systems ("You also can't choose random CDs, which I suppose is the advantage of shops as you can just search at random"; Section 4.1). Serendipitous browsing of this sort should of course be easier in an MIR system than in the shops—for example, by borrowing from the visual arts the idea of a 'collage machine' [11] that successively displays a series of documents, in this case perhaps CD covers, accompanied by snippets of songs from each album as it is briefly given prominence in the shifting collage. Given the difficulties of developing and applying taxonomy of musical genres, perhaps genre browsing could be better supported by automatic clustering based on similarities of sound or rhythm (for example, using self-organizing map displays originally intended for clustering text documents [18]).

Still other identified behaviors will be less straightforward to support with MIR software. How, for example, could real time collaborative browsing be implemented with the same speed of interaction and sense of immediacy as is achieved when friends flick through CD racks together? Web chat facilities such as those described in the online music community in [12] will remain a poor substitute for face-to-face interactions.

One shortcoming of this type of study is that basing design recommendations for future software on current information handling practices may unnecessarily limit possible interface innovations. The appeal or usability of specific interface designs cannot accurately be predicted by our work, and the development of truly novel or ground-breaking information exploration applications is likely to require developers to imagine new information designs and uses rather than to simply support existing information behavior. In some cases, it may not be possible to evaluate the potential usefulness or effectiveness of a new interface without testing a prototype on potential users. Fernstrom and Maidin, for example, report success in creating a browsing system for musicologists that supported an information need that the potential users had not anticipated:

When showing a musicologist a *sonic browser* prototype, he expressed great surprise, *'I've never seen a collection this way before"* … This is a very important comment as he had been working for a couple of years re-cataloging the collection, from index cards to database, via desktop publishing tools to its final form—a paper based product, ready to print. Still, in paper or data base format, one cannot get a visual spatial overview of, for example, '*here* are the jigs and *there* are the reels'. [original emphasis] [7]

Our work can best be used to suggest information needs that must be filled in a music retrieval system targeted at the general public—for example, the need to support effective browsing by genre or to permit users to browse/search collaboratively.

6. References

[1] Bainbridge, D., Nevill-Manning, C.G., Witten, I.H., and Smith, L.A., "Towards a digital library of popular music", in *Proceedings of the Fourth ACM Conference on Digital Libraries* (Berkeley, CA, USA, 1999), pp. 161-169.

[2] Downie, J.S., and Cunningham, S.J., "Toward a theory of music information retrieval queries: system design implications", in *Proceedings of the Third International Conference on Music Information Retrieval* (ISMIR) (Paris, France, 2002), pp. 299-300.

[3] Duncker, Elke, "Cross-cultural usability of the library metaphor", in *Proceedings of the 2nd ACM/IEEE-CS Joint Conference on Digital Libraries* (Portland, OR, USA, 2002), pp. 223-230.

[4] Ellis, D. "A behavioural approach to information retrieval design", *Journal of Documentation* 46 (1989), pp. 313-338.

[5] Falk, P., and Campbell, C., "Introduction", in *The Shopping Experience* (P. Falk and C. Campbell, eds.), Sage Publications, New York, 1997.

[6] Fabbri, Franco, "Browsing music spaces: categories and the musical mind", presented at the 3rd Triennial British Musicological Societies' Conference (Guildford, UK, 1991), available at http://www.theblackbook.net/acad/others /fabbri990717.pdf.

[7] Fernstrom, Mikael, and O Maidin, Donncha, "Computer-supported browsing for MIR", in *Proceedings of the 2nd International Symposium on Music Information Retrieval* (Bloomington, IN, USA, 2001), pp. 9-10.

[8] Futrelle, Joe, and Downie, J. Stephen, "Interdisciplinary Communities and Research Issues in Music Information Retrieval", in *Proceedings of the Third International Conference on Music Information Retrieval* (ISMIR) (Paris, France, 2002), pp. 215-221.

[9] Glaser, B., and Strauss, A., *The Discovery of Grounded Theory: Strategies for Qualitative Research* (1967), Chicago.

[10] Goffman, Erving, *The Presentation of Self in Everyday Life* (1959), Anchor Press, New York, NY. As referenced in Prus, 1993.

[11] Kerne, Andruid, "CollageMachine: An Interactive Agent of Web Recombination", *Leonardo* 3/5 (November 2000), pp. 347-350.

[12] Kibby, Marjorie D., "Home on the page: a virtual place of music community", *Popular Music* 19/1 (2000), pp. 91-100.

[13] Kim, Ja-Young and Belkin, Nicholas J., "Categories of music description and search terms and phrases used by non-music experts", in Michael Fingerhut (Editor) *Proceedings of the Third International Conference on Music Information Retrieval: ISMIR* (Paris, France, October 2002), pp. 209-214.

[14] Lancaster, B., *The Department Store: A Social History*, Leicester University Press, Leicester, UK, 1995.

[15] McPherson, J.R. and Bainbridge, D., "Usage of the MELDEX Digital Music Library", in *Proceedings of the International Symposium on Music Information Retrieval* (Bloomington, IN, USA, 2001), pp. 19-20.

[16] Pachet, Francois, and Cazaly, Daniel, "A taxonomy of musical genres", in *Proceedings of the Content-Based Multimedia Information Access Conference (RIAO)* (Paris, France, April 2000), vol. 2, pp. 1238-1245.

[17] Prus, Robert, "Shopping with companions: Images, influences and interpersonal dilemmas", *Qualitative Sociology* 16(2) (1993), pp. 87-110.

[18] Rauber, Andreas, Pampalk, Elias, and Merkl, Dieter, "Using psycho-acoustic models and self-organizing maps to create a hierarchical structuring of music by sound similarity", in Michael Fingerhut (Editor) *Proceedings of the International Symposium on Music Information Retrieval* (Paris, France, October 2002), pp. 71-80.

[19] Reekie, G., *Temptations, Sex, Selling and the Department Store*, Allen and Unwin, Sydney, Australia, 1993.

[20] Ruffins, F.D., "Reflecting on ethnic imagery in the landscape of commerce, 1945-1975", in *Getting and spending: European and American consumer societies in the Twentieth Century* (Susan Strasser, Charles McGovern, and Matthias Judt, eds.), Cambridge University Press, Cambridge, 1998.

[21] Smith, L, and Medina, R., "Discovering themes by exact pattern matching", in *Proceedings of the International Symposium on Music Information Retrieval* (2001), Bloomington, IN, USA, pp. 31-32.

Appendix: Interview questions

1. What kinds of music do you like to listen to?
2. How many CDs, cassettes, mp3s, etc. do you own?
3. How do you usually acquire music? (For example, shopping (store, online, mail order), downloading mp3s, …)
4. Do you ever get music from the public library?
5. Do you ever listen to the radio?
6. Do you ever watch music videos?
7. Do you particularly notice the music/CD ads on TV?
8. Are there any music magazines, websites, etc. that you read?
9. Can you recognize different artists or types of music by the CD cover art?
10. Do you go to music/CD stores to browse, rather than to purchase a particular item?
11. Is there any particular store that you prefer? Why?
12. Talk me through a typical visit to your favorite store.
13. Do you ever use the 'listening post' or ask to listen to a CD?
14. How comfortable do you feel asking the people at the counter for help or to listen to a CD?
15. Do you every listen to sound clips online, for example at Amazon, to see how a particular album sounds?
16. Do you ever go shopping with friends?
17. Do you give music (for example a CD) as a gift? Receive music as a gift?
18. When do you listen to music? Do you listen to different types of music at different times?