

INVESTIGATING USER PERCEPTIONS UNDERLYING SOCIAL MUSIC BEHAVIOR USING Q METHODOLOGY

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ABSTRACT

While prior studies investigating the social aspects of music provide a landscape of users' various social behaviors around commercial music services (CMS), there remains a lack in understanding of users' perceptions and value judgments underlying these behaviors. Specifically, there is more to learn about what influences and behaviors individual music users perceive as meaningful in social contexts. We used the Q methodology to explore which behaviors and influences are important to CMS users and why. We extracted two factors that explain the two different viewpoints shared by groups of music users, focusing on how they perceive the meaning and value of different social music behavior and interactions. From these findings, we then revised an existing social music coding dictionary and interaction model and offer new CMS design insights.

1. INTRODUCTION

Music is both personal [1], [2] and part of our social experience [1], [2], [3], [4]. Technologies in use affect what activities occur around music [5, 6] as does the physical and social context of how and where people interact with technology [7]. Furthermore, information technologies have become entangled with individuals' sense of self and social experiences [8]. Commercial music services (CMS), a type of information technology, are part of this ecosystem where individual and social experiences come together with current technologies.

Since music and technology are both so personal, improving our understanding of why CMS users find certain interactions with music and technology to be personally meaningful can help derive design decisions for new CMS technology to better meet these specific needs. Furthermore, in recognizing the influence of technology on music-related activities and the pace of CMS technology change [6], understanding what is meaningful to individuals within socially complex ecosystems can support forward-looking and contextually relevant design decisions.

Although there has been periodic research on music-related social behaviors and technology [4], [6], [9], [10], [11], [12], [13], [14], [15], [16], these studies focused on describing the different behaviors surrounding CMS and less on understanding how and why some behaviors and behavioral influences may be more significant to certain users than to others in social contexts. Previous research methods used include surveys [11], [12], [13], [15], [16],

interviews [4], [12], [14], [15], contextual inquiry [10], ethnographic inquiry [9], ethnographic observation of prototypes [15], field trial of prototype technologies [15], and focus groups [6]. While these methods were appropriate for their studies' goals, we still have a limited understanding of the personal significance of social behaviors surrounding music and the significance of influences on those social behaviors. In other words, we have a better understanding of how users behave in certain ways when it comes to using various music services, but less on what they perceive as meaningful or valuable from their own individual perspectives.

To address this gap, we conducted a study using the Q methodology, a method that better captures the personal significance of social behaviors. First developed in psychology in 1935 [17], [18], the Q methodology has since entered the Human-Computer Interaction (HCI) community [19], [20]. The Q methodology "asks its participants to decide what is 'meaningful' and hence what does (and what does not) have value and significance from their perspective" [18]. Furthermore, it is "used to explore (and to make sense of) highly complex and socially contested concepts and subject matters from the point of view of the group of participants involved" [18].

Using the Q methodology, we identified two distinct segments of CMS users within our participant group. Within each segment, users share similar perspectives about social behaviors surrounding CMS and associated influences on those behaviors. Additional contributions of this research include revisions for an existing coding dictionary and interaction model, and new design insights. Furthermore, the user segmentation could potentially contribute to existing personas identified in previous Music Information Retrieval (MIR) user studies [14], [21].

2. RELATED WORK

2.1 Social Practices Related to Music

Prior research laid the foundation for understanding social practices—and the influences on those social practices—where music intersects with technology. O'Hara and Brown's work captured social practices surrounding music and technology such as sharing, exploring, and peeping at a time when MP3 sharing platforms like Gnutella, Kazzaa, and Soulseek were still in use [15]. The social contexts for these practices included cars, public locations, workspaces, and dance clubs [15].

In 2013, as more users started to stream music and use the Bluetooth features on their mobile phones, Leong and Wright [4] observed the following social practices in



shared settings: exploration, discovery, selection, listening, and sharing. In the same year, Belcher and Haridakis [22] identified social motivators as influences to music listening and selection behaviors. In 2015, Yang et al. [23] identified peers as an influence on the practices of unauthorized music downloading and sharing. Later in 2017, Hagen and Lüders [1] studied how users listen, discover, share, and follow given social features on music streaming services. More recently, Spinelli et al. [6] identified nine social practices and twenty-four influences on these practices at the intersection of music and technology. Park et al. [16] also derived a collaborative playlist framework identifying sharing, recommending, and bonding as social purposes for how collaborative playlists served study participants. Lee et al. [24] explored music recommendations and also identified possible “disparities in how people wish to receive music recommendations and what will influence them to listen to recommendations, versus how they would like to offer recommendations to others.”

This body of work builds a compelling story around the social practices surrounding CMS. Our work specifically aims to build upon the comprehensive model of practices and influences identified in prior research [6] and provide insight into how individual CMS users or segments of users perceive the different practices and influences around CMS. The Q methodology was selected to provide a holistic understanding [18] of how these practices and influences were perceived by a group of CMS users.

2.2 Methodology

Meloche introduced an established form of the Q methodology to the field of HCI in 1999 [19]. He believed the field would benefit from the method’s ability to reveal the subjective views of individuals [19]. While the Q methodology has not previously been used to study CMS, forms of the method have been used to study other information technologies such as: studying a communication system for children [20], exploring user segmentation of technology services by information seeking preferences [25], and studying the health and technology attitudes of patients to inform the design of self-management interventions [26].

The Q methodology has also been used to study subjective views around music. Wacholtz [27] applied the method to investigate musical preferences and identify different listener types for country music. McKenzie and Brown [28] also studied the musical preferences of students and teachers related to popular music, identifying and describing three factors. While not directly focused on music and CMS, Davis and Michelle conducted research using the Q methodology focused on relevant media audiences and included a comprehensive bibliography of Q methodology research that studied media audiences and media users [29].

Both critiques and criticisms of the Q methodology and its implementation have been made and addressed over the years [30], [31]. A commonly noted challenge of the Q methodology is the potentially ambiguous nature and process of building the Q set [18], [32], [33]. To address this, our application of the Q methodology incorporated results from focus groups where constant comparative analysis was used to develop a Q set after the initial phase of a

multi-method study design. Although interviews are often included as a possible method to support the development of a Q set [33], focus groups can enable richer open-ended discussion and interaction between participants which then can help form a meaningful Q set [25], [34]. Researchers also take mixed method approaches incorporating Q methodology—for instance, combining the Q methodology with R-method surveys, a quantitative method [35], [36].

3. STUDY DESIGN AND METHOD

We employed a multi-method approach that harnesses the strengths of both focus groups and the Q methodology. In Phase I, we selected exploratory focus groups to capture a wide breadth of statements from participants that described their social practices and associated influences they have experienced surrounding CMS. In total, the focus group study identified twenty-four possible influences on nine different social practices (both social practices and their influences are subsequently referred to as “themes”). The findings are reported in the Codebook of Social Practices and Influences [6]. In Phase II, the Q methodology was used to study the personal significance of the themes that were uncovered in the focus groups. Focus group statements from Phase I formed the basis for a set of items (the Q set) used in the Q methodology. This paper reports our findings from Phase II.

Twenty-four participants took part in the Q methodology component of this study, of which seventeen participated in Phase I. Each participant completed an in-person sorting activity, followed by brief interviews at the University of Washington, Seattle. These sorting activities and interviews, followed by a factor analysis method and factor interpretation to uncover participant viewpoints, comprise the Q methodology. Each of the 24 individual sorting activities and their follow-up interviews took between 30 minutes and an hour. A facilitator and a note-taker were present at each session. Sessions were also recorded and transcribed to ensure accurate analysis.

3.1 Selection of Participants

Recruitment activities for study participation consisted of displaying flyers, posting to listservs, and posting on social media as well as physical flyers placed on boards around the university campus and in nearby businesses. Participants were compensated with \$15 Amazon gift cards for being part of this study. All recruiting avenues directed potential participants to a screener survey.

A screener survey was used to ensure all participants were between the ages of 18 and 34, currently lived with at least one other person, and used at least one CMS. The same screening criteria was used for identifying focus group participants. In total, 24 participants from the screener took part in an individual, in-person card sorting activity and subsequent interview. Of the 23 participants who chose to report a gender identity, 15 were female and 8 were male. Twenty-one participants were between the ages 18 to 24, and 3 were ages 25 to 34. Participants used a diverse array of CMS currently on the market including Spotify, Pandora, Google Play Music, YouTube, Soundcloud, etc.

A Level of Group Intimacy Researchers believed, a priori, that items of this theme pertained to the level of familiarity between group members in a social situation.

- A.1 I am comfortable recommending or picking songs to listen to when hanging out with close friends.
- A.2 I am comfortable picking music that my close friends will like in social gatherings.
- A.3 I am comfortable with my roommates hearing everything I play.
- A.4 I would not hesitate to tell my friends to change the music that is playing.
- A.5 I would put my headphones on if I did not want to listen to the music that is playing in a shared space.
- A.6 I do not feel comfortable making music recommendations in a large group setting.
- A.7 I feel comfortable asking to connect my phone/laptop to a speaker at someone's house that I do not know well.
- A.8 I do not mind sharing my music taste with people I do not know well at social gatherings.
- A.9 I change the music in a large group setting if I do not like it.
- A.10 I trust people to use my phone or laptop to play music at a large gathering (e.g., party).

B Effort/Engagement Researchers believed, a priori, that items of this theme pertained to the level of effort or engagement an individual is willing to put forth or the responsibility an individual is willing to take on when engaging with music in a social situation.

- B.1 I like being the DJ if others give recommendations.
- B.2 I like being the DJ and playing only my music at social gatherings.
- B.3 I match the music playing to the mood of the group.
- B.4 I would like for everyone to take turns adding music to a playlist.
- B.5 I am comfortable forcing my friends to listen to my music recommendations in a social gathering.
- B.6 I do not mind being the DJ if I can easily pick a playlist for the mood or activity.
- B.7 I like not having to think about what music to play in social gatherings.
- B.8 I do not mind changing the song if others do not like the music that is playing.
- B.9 I like letting other people choose the music in social gatherings.
- B.10 I like being able to add music to a queue in social gatherings.

C Privacy and Security Considerations Researchers believed, a priori, that items of this theme pertained to considerations relating to privacy and/or security that influence an individual's actions in a social music practice.

- C.1 I would not let other people use my phone/laptop to listen to music.
- C.2 I trust people to not snoop around on my phone/laptop if they are using it to pick music to play.
- C.3 There are certain types of music I only listen to when I am alone.
- C.4 I chaperone my phone/laptop if it is being used by others to play music in social gatherings.
- C.5 I do not mind others playing music from my music accounts if I am already logged in and we are listening to music.
- C.6 I am not concerned about other people knowing what I listen to.
- C.7 I do not mind sharing my login for a service with my roommates.
- C.8 I keep an eye on my phone/laptop if it is being used to play music at a party at my house.

Table 1. The Q set consists of items that represent themes of intimacy, effort, and privacy and security. Analysis and interpretation of study results are based on the participant's interpretations of items as expressed in post-sort interviews, not necessarily the themes they were intended to represent (shown here).

3.2 Q Set Generation from Focus Group Data

A Q set is a diverse collection of items curated to broadly represent the subject matter at hand, with each item "making a different (but nonetheless recognizable) assertion" [18]. For this study, the themes and items were elicited from focus groups where social practices and their related influences were discussed [6]. Researchers chose the themes to investigate using two criteria. First, the personal significance of each theme had to appear to vary within the participant group. Second, the themes had to appear interrelated. Both the themes and relationships between themes were identified on an affinity diagram created using a process of constant comparative analysis. Three influences on social music behaviors met these criteria and were selected as themes of focus for this study: 1) level of group intimacy, 2) level of effort and engagement, and 3) privacy and security considerations.

Researchers reviewed the focus group transcripts that had previously been coded with at least one of the three themes to gather items for the Q set. Statements were selected as items for the Q set based on three criteria: focus, coverage, and balance [33]. Focus refers to including items that can be sorted by a "single, face-valid assumption" [33]. Coverage refers to the set being "broadly representative" of the domain at hand [33]. Balance refers to including all the opinions and perspectives in the Q set [33]. After items were selected, the Q set was piloted to ensure participants understood both the items and sorting activities for the study.

3.3 Q Sorting Activity and Interviews

During a Q sort, individual participants organize items (Table 1) into a forced distribution known as a Q pyramid (Figure 1) and place items they agree with most to the right (+3) and most disagree with to the left (-3). During the Q

sort and subsequent interviews, participants express their interpretations of items along with their reasoning for placement into the Q pyramid.

We laid out three pieces of paper for Agree, Disagree, and Neutral along with the Q set items printed out on cards. We asked participants to sort the Q set cards into the three groups and afterwards, arrange the cards in accordance with a provided image of a Q pyramid. After participants had finished sorting the cards, we asked them to tell us about the items they felt most and least strongly about as well as the items in the center of their distribution (See supplemental material for the complete protocol). Individual Q sorting activities with post-sort interviews were held privately for confidentiality.

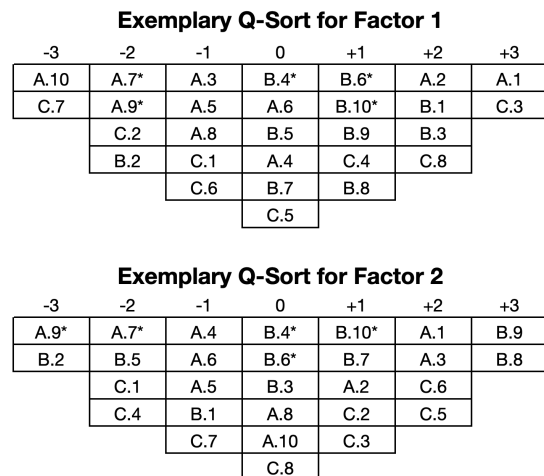


Figure 1. Factor exemplifying sorts for Factor 1 and 2 displayed in the Q pyramid used in this study. Consensus items that do not distinguish one factor from another are flagged (*).

3.4 Analysis

Analysis of the Q sorts is completed using “a by-person factor analysis in order to identify groups of participants who make sense of (and who hence Q ‘sort’) a pool of items in comparable ways” [18]. We took an inductive approach using a process in line with exploratory factor analysis [33] as we observed that individuals in the population valued the three themes in the Q set differently, but we did not have a hypothesis about the differences. Factor arrays—representative viewpoints of the perspectives expressed by participants in their Q sorts—were extracted from a correlation matrix, built from the intercorrelation of all the Q sorts [33]. Factor extraction was done at the same time as the coding of post-sort interview transcripts.

Factor extraction was conducted using PQMethod; a free software dedicated to the Q methodology [33]. To determine the appropriate number of factors to extract, we first used the Kaiser-Gutman Criterion followed by a Scree Test. We then performed a varimax rotation on the factors and extracted our final factors. We determined PQMethod’s pre-flagging was both appropriate and more than sufficient for our exploratory purposes. Including every sort in the creation of factor estimates increased the reliability of our factor estimates and arrays while reducing error [33]. Thirteen Q sorts were flagged for Factor 1 and eleven Q sorts for Factor 2. To enable cross-comparison between factors, total factor estimate scores are converted to Z scores [33]. Exemplary factor arrays for Factor 1 and Factor 2 were then created from Z scores (Figure 1).

In preparation of Factor interpretation, post-sort interview transcripts were coded. The transcripts were coded with the relevant Q sort item being discussed, the exemplary Factor number that represents the participant making the statement, and the applicable themes from the Codebook of Social Practices and Influences [6]. By coding transcripts with the Q sort item and Factor number representative of the participant, we were able to quickly filter relevant statements to interpret each factor array. Themes from the Codebook of Social Practices and Influences captured the meaning of the Q set item as expressed by each participant in post-sort interviews rather than by the researchers’ a priori beliefs. The two exemplary factor arrays identified during factor extraction are representative viewpoints of the perspectives expressed by participants in their Q sorts [33].

Factor extraction and coding of transcripts provided the foundation for factor interpretation, which was conducted applying Stenner and Watts’ Crib Sheet method to each factor array [33]. Items were separated into four categories: items ranked at +3, items that ranked higher than other arrays, items that ranked lower than other arrays, and items that ranked -3 (Figure 1). Following an abductive process, each item was interpreted individually and then in the context of the entire viewpoint. Item by item, the viewpoint grew into the holistic viewpoint for the factor array. During this process, participant statements and themes from the prior work provided insight into how participants interpreted each item in context of the larger Q set. Our interpretation at this stage reflected this understanding of items, not our a priori understanding of each item. Using this lens, we found all items supported a holistic viewpoint

for each factor, including consensus items that did not rank differently across factors.

4. RESULTS

For this study, we reached a two factor outcome that explains 45% of the total study variance in the correlation matrix. Common factor solutions that capture 35-40% or more of the total study variance are considered sound [33], [37]. Eigenvalues (EV) provide another way to compare factors within a study, and a higher EV is viewed as positive [33].

A cross-factor analysis identifies 23 items as being ranked significantly differently at the $p < 0.01$ level. Five consensus items were identified as non-significant at $p > 0.01$. This means the two identified factors (participant groups) had statistically significantly different views about 23 items but generally agreed on 5 items. Factor 1 is factor-exemplifying for 13 Q sorts, or put another way, Factor 1 is representative of the Q sorts of 13 participants. Factor 2 is factor-exemplifying for 11 Q sorts.

In the following subsections, we provide the viewpoints developed from interpreting the factors in the context of post-sort interviews. The supporting Q sort item identifier and item rank used for factor interpretation are included for each statement in the viewpoints (i.e. identifier: rank).

4.1 Factor 1 Interpretation: Viewpoint 1

Users with Impression Management and Security Concerns, but also Confident Music Selectors

Factor 1 explains 23% of the total study variance and has an EV of 7.26. Thirteen participants are significantly associated with this factor.

These users did not want others to know the type of music they were listening to due to impression management concerns or appropriateness for the social situation. They had impression management concerns; they did not want their roommates to know what they listen to (C.3: +3; A.3: -1) and considered some of the music they listen to as guilty pleasures (C.3: +3; A.3: -1; C.6: -1). Another reason they listen to music alone is they believed some music types are not appropriate for social situations (C.3: +3).

In social situations, these CMS users are confident in their ability to pick music that their social group will enjoy (A.1: +3; A.2: +2). They believe they can match music selections with the mood of a gathering, and this becomes easier when the gathering is intimate (B.3: +2). They are so confident in their understanding of their close friends’ music tastes that they may force them to listen to a song they know their friend will like; this would not be the case for friends they know less intimately (B.5: 0). Similarly, in large group settings they recommend generic, safe choices—they choose popular songs due to impression management concerns that an untested song will not be appreciated by the group (A.6: 0; A.8: -1).

Although they would not hesitate to tell a close friend to change the music currently playing, they feel it is often unnecessary or inappropriate (A.4: 0). ***They believe they can tolerate any music in a social situation*** (A.5: -1) ***and think it is especially rude to change other people’s music***

in large groups (A.9: -2). In fact, they do not expect to be able to provide input in many situations—like at someone else’s wedding (B.10: 1). When they are playing music, they do not mind changing the song if there is group consensus that it should be changed (B.8: 1). They also do not mind situations where everyone takes turns adding songs to a playlist as long as the flow is consistent (B.4: 0).

When they are with their friends, these CMS users prefer to focus on interacting with them, and not on choosing the music (B.7: 0; B.6: +1). It is a lot of effort to pick all the music for an event, and it is not considerate to ask guests to pick songs (B.2: -2). **Anything that reduces the amount of effort needed is seen as beneficial, like selecting a playlist** (B.6: +1). They want to reduce their impression management concerns and their effort in selecting music for social situations (A.9:0). When others give recommendations, it ensures these users do not have to take responsibility for what they play—something they really like (B.1; +2; B.9: +1). An added benefit is that letting others choose the music reduces the effort they need to put into the activity (B.1: +2).

These CMS users generally do not trust that others will not snoop on their phone or laptop (C.2: -2). This is especially true in large groups where they would never share their phone (A.10: -3). In more intimate settings, they will likely let friends use their account to play music if they are already logged into an account (C.5: 0). Regardless of how intimate the situation is, they will monitor their device to make sure snooping does not occur and device use is limited to the music app (C.8: +2; C.4: +1).

4.2 Factor 2 Interpretation: Viewpoint 2

Very Considerate CMS Users with Almost No Impression Management or Security Concerns

Factor 2 explains 22% of the total study variance and has an EV of 3.44. Eleven participants are significantly associated with this factor.

These CMS users are not concerned about other people knowing what they listen to at all (C.6: +2). **They do not have any privacy concerns about their music tastes and do not mind if that information becomes known to the group** (A.3: +2). They would share their tastes if people at a gathering were interested but are also okay if people are not interested (A.8: 0). They listen to certain types of music alone if it is not popular with their friends or if the music does not fit with the social event (C.3: +1).

They are comfortable making individual song recommendations to friends because they are familiar with their tastes (A.1: +2; A.2: +1). It would be very unlikely for them to force a friend to listen to a music recommendation (B.5: -1).

When confronted with music they do not like, they want to be considerate, likely tolerating a song they do not like or leaving the physical space (A.9: -3; A.5: -1). Some in this group worry that putting on headphones to block out music is antisocial (A.5: -1). They really want to be considerate of others and not critical (A.9: -3). Rather than putting on headphones they might instead comment that they liked music that was played earlier, and in that way, gently nudge music selection back in that direction

(A.9: -3). Unless they are in an intimate situation, like a small group in a car, they probably would not tell a friend to change the music (A.4: -1).

These CMS users are very considerate of others’ experience with music and will participate in music activities that support everyone’s enjoyment (B.8: +3). However, they do not want to make the decisions and do not want to be super engaged (B.9: +3). They prefer not to think about what to play at a social gathering (B.7: +1). They would hate being the DJ and sole decision maker at a social gathering because of how much effort it would involve (B.2: -3). To reduce the effort of selecting music, they might select a playlist, but they would still rather not have to select anything at all (B.6: 0). When selecting music they would try to match the mood of the group, but they are not confident they would be able to (B.3: 0) and are unsure that they could select the best music for the group and situation (B.2: -3). They also do not believe it would be considerate to others if they were the only ones selecting music (B.2: -3). Thus, if needed, they would take recommendations to ensure everyone is happy (B.1: -1). They like the idea of everyone being able to give input even in a large group setting, but they do not think it is always necessary or that people should feel compelled to do so (A.6: -1; B.4: 0; B.10: +1). They definitely want to make sure everybody is happy (B.3: 0).

Although they would prefer to use someone else’s device, they would let others use their phone/laptop to listen to music (C.1: -2; C.4: -2). While they would not want people to snoop, they trust that people will not do so (C.2: +1). They also do not think they have anything embarrassing on their phones and laptops (C.2: +1). They envision that they might be concerned about leaving their phone or laptop out to play music in situations with a lot of strangers, such as a large party, but they have done so in the past without issues (C.8: 0; A.10: 0). However, when they are at someone else’s house they do not know well, they would not feel comfortable asking to connect their phone/laptop to a speaker (A.7: -2). They would prefer others to share their logins, but situations have come up where they would share their own logins (C.7: -1); e.g., they do not mind sharing an account if they are already logged in (C.5: +2).

5. DISCUSSION

This study provided two clear viewpoints in the form of exemplifying Q sorts for two different segments of participants. The viewpoints captured the inter-relatedness of themes pertaining to social music behaviors and associated influences surrounding CMS. We confirmed that the viewpoints are an excellent way to evaluate design insights especially with a deeper understanding of influences that could drive or inhibit the adoption of a new design [25]. While a focus group study inspired many ideas, the Q methodology left us with a clearer vision of what some segments of participants would love, hate, or not care about. Based on the results of this study, researchers will also be able to investigate how viewpoints identified here can contribute to personas already existing in the field [21].

5.1 Updating an Existing Model

The Q methodology uncovered shortcomings in our interpretation and understanding of participants' statements made in focus groups. For example, Q set item A.5 *I would put my headphones on if I did not want to listen to the music that's playing in a shared space* was interpreted by researchers as it relates to intimacy. This was our a priori belief when building the Q set. After interpreting the post-sort interviews however, it became clear many participants interpreted item A.5 as it relates to considerateness and social norms rather than intimacy. Thus, analyzing participants' post-sort interview statements not only gave insight into why they sorted items the way they did, but also into how they interpreted those items.

Insight gleaned from post-sort interviews led to a better understanding of participants' viewpoints and to the identification of issues with the coding dictionary and the model from the focus group study [6]. For example, *Privacy and Security Considerations* is a theme that emerged from focus groups describing an internal influence on social practices surrounding music. Items capturing the breadth of *Privacy and Security Considerations* discussed by participants in focus groups were selected for the Q set. This Q methodology study uncovers that privacy was an inclination, almost a behavior, driven by impression management, security, or both. An updated codebook and model reflects this finding by keeping Impression Management as a theme and separating Privacy from Security considerations.

5.2 Applied Design Insights for CMS

5.2.1 Social Playlist for Gatherings

As participants in both viewpoints appreciate any features that reduce the effort needed to select songs or playlists for a group due to impression management concerns, we suggest CMS to include auto-suggested playlists that are based on the listening history of group members who have opted into this function. At a group gathering, hosts can invite their guests to add their listening history and music preferences into the mix so that the CMS can add or suggest songs for the queue. The host's invitation to guests validates and follows a previous recommendation to maintain social norms [6], such as the host having ultimate say in who chooses music for a co-located gathering. After group members have opted in, the CMS would (1) automatically queue up "safe" songs that have been previously played by a majority of individuals in the group and (2) suggest additional songs for each user to add to the queue. Suggested songs would either have been played/liked by someone else in the group or have a strong match for other criteria that the group could also select, such as a mood or social situation. Suggested songs would not be as "safe" as songs that are automatically queued, but would still reflect the interests and character of the group. This feature could alleviate viewpoint 2's lack of confidence in suggesting songs for the group since the CMS would only suggest songs where evidence of it being liked by others exists. For viewpoint 1, this feature would decrease the effort needed to think of songs that the group would like, providing them with more time to connect with others, which they value.

5.2.2 Jukebox Mode: Public-friendly Mode of CMS

For situations where a device, such as a phone or laptop, is passed around in social gatherings for guests to add songs to the queue, we recommend designers include a "Jukebox mode" on the CMS. This would lock away all of the device's other applications and private communications so that they are hidden, and only the owner can unlock the phone again to its full capabilities. Additionally, Jukebox mode would switch the CMS interface to a public-friendly version of the app, hiding the owner's private playlists so that other guests cannot view the owner's music listening history. Essentially the device becomes a jukebox, where guests can only use the device to access the CMS and its library of music. Also, a guest's music selection would not affect future music recommendations for the owner, which was another concern that CMS users expressed with sharing their phones in group settings. While akin to the Guided Access feature currently available on iPhones and Androids [38], [39], where users can lock the device to a single app on the phone through a phone setting, this feature would be part of the CMS. This mode would accommodate viewpoint 1's hesitation to have their device be used for music selection purposes, assuaging their fear of others snooping and mitigating their need to chaperone their phone. While viewpoint 2 was slightly more comfortable with others using their devices than viewpoint 1, they were less comfortable sharing in larger, less intimate groups. The "Jukebox mode" could thus address both of these viewpoints' concerns.

6. CONCLUSIONS AND FUTURE WORK

In this work, we identified two viewpoints shared by different segments of our participant group, updated a codebook and interaction model, and generated design insights. We learned how our participant group perceives social practices and associated influences surrounding CMS.

While this research is a step forward in addressing the gap in understanding social practices and associated influences surrounding CMS, the identified segments are not generalizable to the general population. A survey, informed by the segments identified in this study, would provide insight into the generalizability of these findings. Future research could also explore CMS users' perspectives in relation to culture and geography.

We believe that focus groups and other qualitative methods could support systematic Q set development, but this process has yet to be fully explored. Specifically, from this case study on social music practices, we found that exploratory focus groups and the Q methodology are excellent complementary methods. Analyzing data through constant comparative analysis, affinity diagramming, and coding of transcripts were effective in identifying the scope of the Q methodology research and generating a Q set. In future research, we plan to investigate other elicitation methods and analysis techniques to form Q sets, and explore the use of the Q methodology as a complement to methods such as narrative analysis and ethnographies. Additional research into this multi-method approach is notably important for researchers studying topics that are especially personal and private, where focus groups would not be an appropriate complementary method.

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