

Risk "attention" or "adventure": A Qualitative Study of Novelty and Familiarity in Music Listening

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ABSTRACT

While recommendations systems have shown great improvements in generally predicting relevant items, they still face challenges in achieving the delicate balance between novel and familiar options. Existing works in pursuit to address the challenge have focused on the activity logs and algorithms while largely ignoring the user-specific needs and challenges in the balance users seek between novelty and familiarity. As a result, the assumptions imposed on user actions based on activity logs are limited and could lead to misinterpretation of users' needs. To better understand user needs, in this paper, we study users engaged in online music listening activity to understand users' interpretations and rationales in their novel and familiar music selections. We show that a combination of factors, both explicit and implicit, such as boredom, need of attention, risk of a bad selection; that play influential role in users' novel and familiar music selections. We discuss the findings and the implications for user interactions and user modeling that could help better understand what, when, and how users seek the balance between novelty or familiarity in their recommendations.

KEYWORDS

Music Recommendation; User Preferences; Qualitative Study; Novel Versus Familiar;

1 INTRODUCTION

The giant ecosystems of music providers, such as Spotify, Apple Music, Pandora, Amazon Music, etc. boasts abundance in choices of content to attract users (e.g. all the music you want in one place) creating tiers of content access for a variety of scenarios [9]. While these options promote variety and freedom in choice for users in aim to provide better experience, they also pose a challenge to users who feel paralyzed and confused with an overwhelming number of choices [37].

Realizing that vast collection of content is both challenging [41] and limited in their ability to provide great user experience [36], content providers have adopted more subtle and distinct interpretations of users' taste in form of playlists [46], radio stations [27], etc using popular recommendation algorithms. These algorithms based on historical consumption data from the action logs strive to achieve the delicate balance between helping users discover new music versus helping users find familiar well known options [19].

The existing techniques, however, in their pursuit to find the balance have largely ignored the user-specific needs. For instance, a user might find comfort in familiar choices at times whereas could solicit the excitement or delightful surprise from novel or

previously unseen options. While prior works [25, 28, 30] based on online music activity logs demonstrated that understanding users' consumption of novel and familiar options in previous sessions play a critical role in interpreting users' needs for novelty, the insufficient context about users' intent in activity logs makes the assumptions imposed by previous methods on what users listen to, to be misinterpreted. For instance, a user who likes jazz and chooses to listen to a new jazz album could do so for variety of reasons, such as the user wants to catch up on a new album he/she has not listened to yet, is bored with his or her existing selection, or has discovered an artist from a recent jazz event, a friend, or online media. These factors thus play critical role in users' selection of music and the balance they seek in the amount of novelty or familiarity in their music.

As a result, in this paper, we use a qualitative approach to study users while they engage in music listening activity to understand *what* and *how* they balance between the novelty and familiarity in their music selection. We use the Contextual Inquiry (CI) method where one gathers information about users while they perform their tasks in the given context. This approach provides a medium that allow users a conversation to reflect upon and provide self-interpretation of their actions for better explanation [21].

Through our analysis of about 800 codes generated from 14 such conversations, we provide insights into user actions and explore answers to the following three research questions:

- **RQ1:** What do users choose? How do users choose? And when and why do they choose to explore novel or familiar selection?
- **RQ2:** What explicit or implicit factors influence users' choices in listening to familiar or novel music and why?
- **RQ3:** What are the common challenges that users face while seeking familiar or novel music to listen to?

We identify multiple factors — such as the effort in finding new music, the risk of a bad choice, the potential loss of attention due to new stimuli, boredom from existing selection, the excitement to explore, as well as the implications of *mere exposure* [6] from external sources — for the balance participants sought in novelty and familiarity in their music selection. We conclude with the design implications of our findings and outline the factors we believe belong in a user model, including *when*, *how*, and for *whom* to *balance* novelty and familiarity in music recommendation.

2 RELATED WORK

Music is considered more ubiquitous than many other media of consumption, such as movies, books, photos, etc. While some view

choosing music to listen to as an expression of free will and mundane [45], music choice is better understood as a product of inter-linked social, environmental, cognitive, and biological factors [2, 38]. Several common-day tasks involve music, such as walking, cooking, cleaning, working, and relaxing, which have their own complex sources of meanings and emotions [45]. Various field and lab studies have found multiple reasons why users listen to music, such as, to manage mood [33], to create social identities [18], or to provide a distraction from their surroundings [15] etc.

However, as online music services grow in popularity, the listening behaviors of people are also changing [31]. The ease of online-streaming, availability across platforms¹, voice-assistants^{2,3}, and the inherent psychological and emotional benefits of listening [15, 43] have made music more accessible and personal to users. These systems follow listeners' trail and similar users' music choices to estimate the likelihood of suggesting a similar but new music. However, even with huge amounts of user data, it can often be challenging to truly understand listeners' motivations for their music choices. The data does not imply why listeners behave or listen in unique ways, especially how and why users seek comfort in their selection at times and the excitement to explore new music at other times.

The challenge to find the delicate balance between novelty and familiarity is critical to recommendation systems [23, 51]. An over-emphasis on novelty in recommendations, for instance, can lead to distrust and frustration [13], whereas an under-emphasis on novelty can lead to boredom and dissatisfaction [8, 19]. As a result, plenty of approaches exist, such as topic-diversification [51], item-taxonomy [47], or declustering [49], to introduce novelty or diversity in recommendation lists.

The newer deep machine learning systems paired with the huge amounts of data are shown to continuously update and change the behavior of a product to match the expectations of users [11]. While the machine learning based recommendations are most likely the only way to efficiently scale music recommendation for millions of users, they also push the focus to infer user preferences from mining the data and overlook user-specific needs in the system. As a result, they impose interpretations based on activity logs without sufficient context of why users make the choices they do. In this work, we therefore take the qualitative approach to better understand user-specific factors to interpret their actions while they engage in music listening activity.

3 METHOD

To study the factors in user actions while they listen to music, we use the contextual-inquiry (CI) method. It is a qualitative approach to obtain information by observing and interviewing participants while they perform the task in their everyday environment. This method, adapted from field research techniques in psychology [12], sociology [17], and anthropology [40], has shown to be effective in gaining better insights and understanding of user actions in online media consumption [7, 10, 26].

Compared to other qualitative methods such as surveys and questionnaires, contextual inquiry does not suffer from recall bias. Surveys and questionnaires assume that users know why they performed a task or what they needed to complete a task. However, while engaged in a task like music listening, people do not necessarily reflect on what they are listening to, making it difficult to form meaningful interpretations of user actions without the context [42]. Instead, CI is effective at uncovering tacit knowledge [21]. It allows participants to engage in dialogues to reflect on and shape the interpretations of their actions while being in the context of the task.

Due to the qualitative nature of the study, we chose a small number of participants to conduct in-depth inquiries with while they listened to their music in their everyday environments. We describe the participants, procedure, analysis, and platforms we studied in the following sections.

3.1 Participants and Procedure

Participants were recruited through informational posters in public places like coffee shops, university libraries, and private workplaces in the cities of Minneapolis and Seattle. Although participation was voluntary, each participant was required to meet the minimum criteria as follows: (a) must be 21 years or older, (b) must listen to music at least 2-3 times in a month, (c) must be comfortable sharing music experience in an everyday environment, and (d) must be able to schedule two 1-hour sessions.

Interested participants contacted researchers via email and were then referred to fill out an online questionnaire to confirm their eligibility. As required by the Institutional Review Board (IRB) [24], in the questionnaire participants reviewed the details and requirements of the study, including their eligibility with regards to their age, their daily music listening patterns, their preferred music platforms, and their preferred times and locations to schedule the interviews. Each participant was compensated with a \$30 Amazon gift card upon completion of the final session.

Based on responses to the questionnaire, we used the "purposive" sampling approach, in which we include participants from multiple platforms, different professional backgrounds, and with different listening patterns such that a variety of users are represented to confirm or challenge emerging patterns [32].

Participants were then invited to schedule two 1-hour sessions, each separated by several days and scheduled at different times of the day to understand users explanations under different contexts, while keeping the location of the interview the same. During each session, for the first 30 minutes participants picked music to listen to while we took notes, with no interruption to the user. In the following 30 minutes, we asked users a set of questions to allow users to explain and reflect on their actions.

Participants' consent was taken during each interview. Participation was voluntary and users were given a choice to stop the interview at any time of the observation session. We noted users' actions, such as browsing, searching, clicking, skipping, and shuffling, while they picked their music to listen to. As music can be a background process while the user focused on other tasks like writing, reading, browsing, etc., we asked users to install Last.fm

¹pandora.com/everywhere

²spotify.com/us/googlehome

³spotify.com/us/amazonalexa

Table 1: Participant Details

	Platform	Age/ Gender	Consumption	Location
P1	Apple Music	20-30/M	Daily	Workplace
P2	Spotify	20-30/M	Daily	Workplace
P3	Pandora	40-50/M	Once per week	Workplace
P4	Spotify	20-30/M	Daily	Workplace
P5	Spotify	20-30/M	2-3 times per week	Transit
P6	Spotify	20-30/F	Daily	Home
P7	Spotify	20-30/F	2-3 times per week	Library/Cafe

scrobbler⁴ (using their own account and consent) to enable song tracking for the music they listened to during the session. This also helped avoid any interruptions while a user was engaged in his/her task. They were reminded at the end of session to uninstall the tool.

Table 1 provides a description of the participants, their backgrounds, and their music listening patterns. A total of 7 participants were selected and 14 interviews (2 for each participant) were conducted in the study. Participants included in the study were professionals from different backgrounds and included one student (P7). Participants had varying degrees of interest in music with two avid listeners (P2 and P6), two with music backgrounds (P1 and P4), and three casual listeners (P3, P5, and P7). While our participants did not span across a wide age range, they do fall within the age group of 22 to 35 year olds; the age group that has most embraced online music streaming services [37]. Among the 7 participants, four participants were observed while at their workplaces (offices) (P1, P2, P3, P4), one while at home [P6], one while working at a public place (library) (P7), and one during transit (P5).

3.2 Analysis

To assess users' responses, we had to determine what songs were familiar to users and which were novel. However, this was challenging due to two reasons: 1) the definition of novelty as understood by a recommendation system is not how users perceive novelty, and 2) every participant was likely to have a subjective interpretation of novelty in their selection. For example, a song that a user really likes but has not listened to in awhile can be novel to the user [1]. Oba et al. in their study of nostalgic experience have shown that items from the past that a user likes but has not seen or consumed recently induces nostalgia in the same parts of the brain that are active during novel exposure [39]. As a result, we did not ask direct questions about users' familiarity or novelty with their music selection. Instead we asked if the music chosen was (a) listened to recently, that is within the last few weeks to a month, which we consider as *familiar*, or (b) listened to in the past but not in awhile or *never* listened to before, which we consider as *novel* in this study. This definition of novelty helps capture the inherent property of repetition in music, which is well known to delight users [3, 34].

After the completion of the interviews, the 14 hours of voice recordings (two hours for each of the 7 participants) were transcribed into open-codes to capture the individual viewpoints, rationales, and interpretations users shared during the sessions. About

⁴<https://www.last.fm/about/trackmymusic>

800 open codes were generated, with each code being reviewed by two researchers. The number of open codes was then significantly reduced in the process of memoing and categorizing using a constant comparison described in affinity mapping [44]. In the process, every code was compared to others and positioned to reflect its affinity to an emerging topic and the research questions. We used the topics to understand the common themes in responses and actions of different participants to answer the research questions. We also captured themes with disparate responses or opinions to gather divergent user perspectives.

3.3 Platforms

Here we discuss the three platforms (Spotify, Apple Music, and Pandora) used among our participants. Although these platforms serve the similar function of streaming online music, it is critical for this study to understand the differences and the types of services each provides. For instance, Spotify and Pandora provide a freemium⁵ service, while Apple Music provides only a paid subscription-based service. Spotify and Apple Music both provide music interactions that include lists of curated playlists, personalized playlists, album/artist suggestions, as well as lists of new releases and top charts. Until very recently, Pandora only provided a list of stations that users could create, or they could choose from existing system-suggested stations based on artist, track, mood, genre, etc. Pandora also provides a few niche options for users, such as selecting *I am tired of this track!* to skip a track, compared to only *thumbs down* or *next* track option in the other two platforms. Finally, all three platforms boast an abundance of music options for users with their premium subscriptions, which each of our participants had for their choice of platform. As a result, each session during the study was ad-free and included all services that the individual platform provides.

4 RESULTS

We now discuss results from the analysis. We first discuss the choices participants made and their intents before listening, followed by key factors identified as common themes across participants that affected their choices of novel and familiar music. Finally, we conclude with key challenges common across participant responses while they sought novel or familiar music.

4.1 Choice of music: What did participants listen to?

We recognize two specific cases in choices participants made to select music to listen to — they either (1) picked music they *knew* they wanted to listen to, that is, a specific artist, an album, or a band or (2) picked music for which they didn't have a specific artist or album in mind but instead had a general preference for the kind of music they wanted to listen to. In the latter case, their choice was specifically to align with specific needs in form of mood, attention, etc. For instance, "smooth Jazz instruments that won't interfere with my studies." The participants' sessions for each case is shown in Table 2. We discuss both the cases and how participants arrived at their choices in this section.

⁵A type of service in which a platform provides the music free of charge, but some premium features like high-definition music or ad-free music are available for a charge.

Table 2: Distinct cases as per user response before they selected the music to listen to during their session. Case 1 is when participants knew what they wanted to listen to, whereas Case 2 when participants did not have a specific artist or album in mind but a general preference of what they wanted to listen to. R1 and R2 refer to the first and second study session for each participant P. The sessions in italics are the ones where participants choice of music was different than what they were listening to in a session prior to the study.

Case 1	<i>P4-R2, P1-R1-R2, P2-R2, P4-R1, P2-R1</i>
Case 2	<i>P6-R1, P5-R2, P7-R2, P5-R1, P3-R1-R2, P6-R2, P7-R1</i>

Case 1: When participants *knew the specific music* they wanted to listen to, they mentioned choosing albums or songs by an artist they had recently discovered. Participants mentioned that discovering music they found interesting but different from what they usually listened to was mostly influenced by external sources, such as “found on a TV show,” “saw it trending on BBC Radio One,” etc.

P4: “I found this artist from a TV show and liked one of the songs I listened to on YouTube. I liked the music and wanted to listen to more of that music on Spotify.”

P2: “I found this DJ from BBC Radio One, which often releases collections of new songs that I like to explore and listen to to see if I like them.”

Participants mentioned that in some cases discovery was not only limited to new artists or new bands they had never heard before, but also included “new songs they have not yet listened to by a familiar artist” and how mentions from friends or news media helped them find this music.

P4: “I heard that a new release is coming up from this band, which reminded me of my previous favorite album from the band. I just wanted to go back to music by the artist before the new release.”

P1: “This remix recently came and my friend shared it with me. I really like the remix, although I generally prefer to listen to the original itself.”

P2: “A new song came from the artist recently and my friend, who I believe has a good taste in music, told me about it. So I wanted to listen. I like the song and will likely listen again.”

A few participants (P4, P1, and P2) also mentioned the role external events and sources play in *reminding* them of an old album or an artist they had not listened to in awhile (P4: “A game I was playing last night had a tune in the background that reminded me of the band I wanted to listen to today...”).

There were a few sessions (P4-R1, P2-R1) during which participants knew what they wanted to listen to but did not choose anything different from what they were currently listening to. Participants chose to continue with an album they were recently listening to or a playlist they had recently curated or that had a list of

songs large enough that they had not listened to the entire playlist yet. When asked about the concern of repetitions, participants mentioned using shuffle to add some uncertainty to the order of songs and that they didn’t mind if some songs repeated over multiple sessions.

P2: “I wanted to listen to the playlist I curated last week. I am excited about the playlist and so I wanted to listen to it again today”

P4: “Spotify created this year-end playlist that I have been listening to for the last couple of days. Although I have listened to most of the songs in the list, I will continue listening for some time, as I don’t remember listening to the same songs due to the sheer size of the playlist.”

Case 2: When they did not have a specific artist, song, or album they wanted to listen to, participants cited that their music selection was to align to the specific needs of that hour. For instance, participant P7 cited the benefit of selecting a jazz playlist she had listened to earlier in the week to avoid the divided attention between music and an assignment that needed focus. (P7: “Was looking for something that I can play while doing my assignment and liked how smooth this playlist is, as it has a more monotonous tone that helps me focus.”).

In another instance, some participants (P6-R2, P7-R1) mentioned their desire for a calming and relaxed mood as a reason for their selection.

P6: “I think I selected the playlist because I was looking for something easy and warm for the mood. It is rainy outside . . . this just fits the atmosphere I guess. I like some songs in this playlist and often choose this playlist to relax.”

P7: “I wanted to be in, like, a good mood as I have a busy night, so I wanted to listen to something happy, upbeat, and generally kind of light, and this is supposed to be happier than other playlists. Also, Christmas is soon and I am a big fan of Christmas music, so I’m kind of getting in a holiday spirit.”

In the case that they didn’t have a specific kind of music in mind to listen to, participants also relied on recommendations from the music streaming platform. They picked an album or playlist that they were very familiar with but had not recently listened to (P5: “Saw the album in the suggestions and I had not listened to the artist (Kendrick Lamar) recently. I really like his songs.”). The participant mentioned the induced boredom from his current selection as a reason to choose something different (P5: “Didn’t want to continue what I was listening to as I have been listening to it for few days now.”).

Summary: Participants found the music they listened to in various ways. Among these cases, we recognize that the participants’ choice of music, and specifically music different from what they were listening to, was due to external events or sources. They mentioned they “discovered an artist from social [media] mentions,” they found “new releases from a familiar artist,” their choice was an “old favorite that I haven’t listened to in a while,” they had seen a “news story that reminded me of a favorite”, or they were simply

“bored from their current selection.” Each of these reasons highlight the users’ excitement to either discover a new artist or rediscover an old favorite from an external source. Whereas for participants who chose to continue with music they had been listening to, they primarily cited wanting “to continue listening to an existing playlist that I have not finished yet,” to listen to an “album or list that aligns with the desired mood,” or to find “a playlist that helps maintain focus on the task at hand.” These users’ rationales suggest they found comfort in listening to music they were currently listening to instead of putting forth the effort to find different music. As such, we observe that the participants’ selections of music were a combination of specific curiosity needs, moods, or desires.

4.2 What explicit and implicit factors influence users choice of music?

There are some key factors we identified across users’ responses for their specific selections of music.

4.2.1 Attention. Music is known to play a crucial role in either aiding or distracting the attention needs of users [14]. Music one likes can help increase focus, while music one doesn’t impede it [22]. Participants (six out of seven participants) mentioned that their degree of attention between music and work play an influential role in their choices of music. They noted that the type of task at hand affects what kind of music they prefer. For example, a task that demands high attention, such as reading to absorb new information, versus a less attention-demanding task, such as browsing online social media, results in different selections of music.

P2: *“I don’t like working to new music. To know whether I like an artist/song, I have to really give it attention. Either figure out the song or do work, can’t do both unless given an attention. As an alternative, if at work and likes something then will save it for later to give necessary attention.”*

Participants mentioned that when attention needs are high, they look for music they frequently play, citing the comfort of listening to familiar music in helping them focus (P7: *“Yes, today I was wanting to listening something like this because I just wanted to focus and I have a lot of stuff to do. I listen to it often when I am studying and writing”*). And, when attention needs are low, they prefer listening to new music (P2: *“Okay being distracted as was in mood to discover new songs”*). They discussed how the excitement from the new stimuli led them quickly down a “rabbit hole” of exploring artists’ discography and other similar artists, thus taking attention away from the task at hand.

P4: *“Explicitly wanted something to occupy more of my attention and listening to new music is an easy way to do that because its a new stimuli. You know, may be discovering a new band or artist, that quickly go down very deep rabbit hole”*

P2: *“I am okay being a little distracted today. It does not happen always but when it happens I am in this way to queue up few things. Picking up related artists from a new song I like is another easy way but also takes the attention away.”*

Apart from new music resulting in distraction, a couple of participants (P3 and P6) mentioned that their past favorite music they have not listened to recently (subset-(b) - novel) resulted in similar distractions as it brings their attention to the parts of tunes or lyrics they like, and the memories associated with the tunes.

Participants (P4, P5, and P7) also mentioned the specific type or genre of music they prefer for specific attention needs. For example, classical or no vocals music to help them zone out from their surroundings to focus on their work at hand (P4: *“..there is instrumental or classical that is not distracting..”*).

To summarize, participants’ attention requirements play a unique role in their choice of music. Participants preferred to choose music they recently consumed with high familiarity when they know the attention requirement of the task at hand is high to avoid distractions, and new or forgotten music when it is low. Participants noted that the effort involved in selecting novel music and the risk of bad selection are often the causes of divided attention – a possible explanation of why familiar music help users find comfort and ease in their choice.

4.2.2 Boredom. Participants frequently mentioned boredom as one of the primary reasons for selecting the music they listened to during the session. They mentioned being tired of their current selections as primary factor in selecting music other than what they were currently listening to. Some participants (P1, P2, and P4) mentioned that they sought exploration and hence looked for new music, whereas other participants (P3, P6, and P5) highlighted the pleasure they sought in playing past favorites they had not recently listened to, which makes them feel nostalgic and relaxed. When asked specifically about which novel music would they prefer, new or past favorites, they cited the available attention and the effort to find new music as the dependent factors.

In addition, irrespective of whether participants chose past favorites or new music, they commonly mentioned seeking music from different genres than they were currently listening to to avoid boredom.

P1: *“I feel like its harder to find something new I could fall in love with in the genre I listened to most. I can more easily find something exciting in a different genre that I don’t usually listen to.”*

P3: *“I did not come across this music (I like) before as I don’t usually listen to this genre.”*

For some participants who were multilingual this meant changing the language of music from what they were currently listening to (P5: *“If I get bored from this, I often go back to choose music from language (native) other than English”*).

4.2.3 Sheer Joy of Adventure. While being bored from current selections was cited as a cause to select new or forgotten music, users also cited “sheer joy of adventure” as the other reason to choose music different from their current selection.

P2: *“I didn’t feel like playing my older playlists. I just woke up today in discovery mood and then looked up a playlist shared by my friend and I found remix of a song that I liked and it all kicked off from there into finding more related artists.”*

The users' choices to seek new artist because of sheer joy of adventure emphasize a limitation on the assumption of user model in existing boredom-based novelty recommenders [29, 30]. They only considered that tendency of user to seek novel music is dependent on the boredom of user with current selection, however as our participants mentioned, it could also be users' appetite for sheer joy of adventure.

To summarize, boredom of participants with their current selections influences significantly what music users choose to listen to. While users look for novel music when bored, they are likely to explore different genres or languages than they were listening to. In addition, the excitement participants sought in new stimuli is not limited only to boredom, but also the sheer joy of exploration that can lead users to choose novel music.

4.2.4 Priming. Users choosing novel music mentioned learning about the artist(s) from conversations with friends [P1, P2, P4], TV shows [P5], music blogs [P2], DJs [P2], online social media [P1], etc. In their effort to recall the external events that affected their choices, participants cited sources they trust more than others. For example, they mentioned only a few friends who they believe have good tastes in music, TV celebrities they like, accounts they follow on social media, and DJs from a reputed radio station, like BBC Radio One, as sources of influence.

Apart from external events, participants also mentioned influence due to recommendations shown on the music platforms (P1: "often choose new album to listen when platform (Apple Music) suggests release of new album from one of my favorite artist")

These events affected users' choice in music in ways similar to the effects of priming, which reinforces the notion that subtle exposure of an entity can cause large effects on the perceived attraction for the entity, also referred as *perceived familiarity*. In social psychology, perceived familiarity is defined as the feeling of acquaintance upon mere exposure to an item [48] that leads to a perceived attraction to the item [35]. Although recommendation systems have studied ways to model perceived familiarity of users [20], inducing this familiarity is often bounded to user interactions within the system [50]. These systems limit the ways to incorporate the effects from sources outside the system—sources in which users place a high degree of trust.

4.2.5 Order in the selection of music. Apart from what participants selected, we also asked participants about their preferences in the order of songs in the playlists and albums they chose to listen to.

Participants who chose playlists mentioned using shuffle to increase the uncertainty in the order of songs (P4: "I usually shuffle the playlist because I don't know if this music is most played or 100th most played, so I usually shuffle if I don't know there is specific ordering that is going in"). However, even with this uncertainty, a few participants who listened to a playlist during the sessions mentioned the desire to listen to their favorite songs in the playlist sooner rather than later for an "instant gratification" (P3) of their choice in playlist.

P4: "Selected a song that I recognized I like in the playlist."

P7: "...would like to definitely listen to my favorites in the mix of songs in the playlist..."

P3: "...instant gratification with your choice of music when it plays songs you are most familiar with..."

A few participants also changed the music they were listening to during the sessions. This included responding positively to a song, leading to queuing up a couple more songs from the artist or other similar artists, or skipping to the next song in the queue. Participants cited that the primary reason to skip a song is to avoid the distraction from the tune or lyrics of the song. One participant mentioned skipping to reach their favorite song in the playlist sooner rather than later (P5: "I selected the playlist as I remember one of my favorite song was in that playlist. I skipped few songs to reach the favorite song quickly. It would have been nice to have that song play earlier.")

Participants who listened to albums, however, cited a distinct tendency to avoid shuffling and skipping. Participants P1 and P4 cited their rationale about avoiding shuffling as albums "represent a statement by an artist and I respect the order the artist wants them to be heard. I listen to whole album front to back as is and always finish the album if halfway through" (P1), and "I rarely shuffle albums. I know that a lot of times a band will structure albums to kind of have an inherent flow to them. I also do not skip songs in an album even with moderate liking." (P4).

To summarize, participants had distinct expectations of the order for albums and for playlists. They preferred listening to an album in the same order it was curated, whereas for playlists they preferred to shuffle the order of songs with an expectation to listen to their favorites sooner for instant gratification.

4.2.6 User Settings. Last but not least, participants P6 and P7 highlighted the effects of setting or environment on their selection of music. Participants discussed how their selection could be different from their current choices based on location, such as the gym, work, home, etc., and the time of day. For instance, some participants (P2 and P7) preferred listening to mainstream popular new releases in the evening to avoid disruptions during work hours (P2: "Even though I really do like their music (a BBC Radio One DJ releasing a new playlist), I prefer listening to these while at home in the evening when I play more mainstream stuff"). Similarly, participants P1, P4, and P6 mentioned listening to non-vocals at work and fast, upbeat pop music during workout sessions.

P6: "Would not choose this music (slow and calming) for a workout or when thinking quickly to match up the rhythm"

Based on the observations of settings across various sessions, we found that participants whose sessions were at the start of the day when the focus on work is still divided selected more novel options. However, participants whose sessions were in the afternoon when they needed to focus more on work chose familiar music to listen to. Other than the attention requirement, we believe another possible explanation can be the fatigue of the day causing participants in the afternoon to choose something comfortable without the added effort of finding and exploring something new.

Users also highlighted that when not interacting with the platform interface, like during workouts or driving, they prefer to pick up music they are most familiar with and currently listening to in order to avoid the pain of selection on the smaller screen of mobile devices.

P4: *“Cause I only have a few songs or albums downloaded on my phone I listen to them (the artist) frequently on the bus or gym and that is one of them.”*

Participants also mentioned the role of mood in their selection of music, such as upbeat music when happy versus melancholic or calm music when occupied with a tedious task [P3, P6, P7].

P7: *None of the songs are favorites, but chose the album due to the mellow and calming nature of the music.*

P3: *Would pick up this artist or this type of music (90s Alternative Rock) when feeling melancholic, as they remind me of teenage years.*

Overall, the setting during the session or the context played a critical role in participants’ choice of music. Most of the participants mentioned a specific choice of music under certain settings, such as fast and upbeat music they are familiar with during workout and gym sessions or exploring new and trending releases during the evening.

4.3 Challenges

We asked participants the explicit challenges they face when they look for music to listen to that is different from what they are currently listening to. We highlight three of these challenges that were commonly expressed in participant responses.

4.3.1 Too many options. Music recommenders have evolved in many ways to help users choose music they want to listen to. Spotify, for instance, suggests songs curated into multiple categories for users to start listening to based on time of day, mood, genre, recent releases, trending, etc. The multitude of choices are appreciated by users as they help cater to different needs [16]. However, participants in the study mentioned that with plenty of options, finding what to listen to becomes harder and that *“..it takes a lot of energy to find something new to listen to.. - P2”*, while wading through the myriad of choices. The high effort involved in choosing among available options was cited as a deterrent to the desire of choosing any new music they have not heard of – *“Does not want to spend limited amount of time I have to a song that I have not heard of” - P3.*

4.3.2 Risk of Failure. Participants mentioned the risk involved in choosing something new.

P1: *“Discovered 3 brand new albums in 1 week but only one stuck around. Tried looking for more popular Jazz Rock but haven’t found them interesting.”*

Participants (P6, P7) mentioned the risk of mismatch of their selection with their desired mood as another reason they avoided selecting new music. In such cases, users preferred listening to

curated playlists in which songs are expected to be similar to a specific genre suitable for the mood requirement of the hour.

4.3.3 Lack of trusted and accessible sources. Participants highlighted trust as an influence in their selection of novel music to listen to. They relied on sources such as friends whom they believe have good tastes in music and media they follow to help them discover more novel music (P4: *“Finding new song can be hard if don’t have the right source.”*). A few participants (P2, P3) also mentioned their frustration with lack of trusted sources, such as BBC Radio One, on their preferred music listening platforms.

5 DISCUSSION

We conducted a contextual-inquiry study to gain insights into how a small group of participants chose novel and familiar music, what factors affect their choices, and the challenges they faced while seeking novel versus familiar music. In this section, we summarize the insights from the study and discuss the possible design implications for effective recommendations.

5.0.1 Balance of Effort, Risk, and Attention. Participants mentioned the effort involved in searching for novel music. This effort contrasts with the comfort they mentioned in continuing to listen to their current music selection, or familiar music. To alleviate some of the effort of searching for novel music, recommendation systems aim to introduce novel items directly into their lists of recommendations. However, in discussing the effort of searching for novel music, participants also mentioned two critical factors of this effort that are often overlooked in the design of recommenders.

First, the risk appetite of individual users. Some participants mentioned greater appetites to explore newer unknown options than others. In our own results in studying the appetite of users for novel items in Chapter 2, we show that a recommender adaptive to the individual differences in novelty consumption is more accurate than a traditional one-size-fits-all recommender.

Second, the potential attention needs of users. Participants cited how familiar music helps maintain their focus when attention requirements for the primary task at hand are high, as well as how exploring novel music is avoided to minimize the interruptions in their focus-intensive tasks. This aligns with prior studies that have shown that *interruptions* from peripheral tasks such as music listening have huge impacts on the primary task at hand, resulting in needing more time to complete the task, committing more errors in the task, and experiencing more annoyance and anxiety [4, 5]. Studies suggest that delaying such interruptions towards the phases *between* the primary tasks causes less disruptive impact. In music listening, these phases could be the intermittent interactions users have with the music service, that is, when users are distracted from their primary tasks. It is at these times that recommendation systems could introduce or suggest novel items in lists of recommendations.

5.0.2 Boredom versus Sheer Joy of Adventure. Participants cited boredom of their current selection or the sheer joy of adventure in exploration of novel music, that is, music different from their current selection. However, we noted distinct differences in the participants’ expertise who sought novel music to avoid boredom versus those who sought novel music for adventure. The participants who mentioned the joy of adventure (P1, P2, and P4) were

arguably the ones who take their music seriously, as their interest in music went beyond just listening. These were the users who create, curate, share, and consume music with others. Also, some of the artists listened to by these participants were found to be more obscure (ex: *Jagga Jazzist* with about 56 thousand listeners on Spotify) than mainstream music. In comparison, the group of participants who cited boredom (P3, P5, P6, and P7) showed more interest in mainstream music, with preferences for artists like *Kendrick Lamar*, who has about 36 million listeners on Spotify. The latter group of participants cited reasons to find or explore different music to primarily manage mood, avoid boredom, or help achieve focus when distractions surround them. Thus, these different levels of expertise can help systems determine a more accurate appetite for novelty for individual recommendations. For instance, the tendency of a participant to continue with their choice of music before they again felt the urge to shake things up was more evident in the second group of participants, whereas the participants who cited the joy of adventure mentioned seeking novel music more frequently.

5.0.3 Perceived Familiarity, Trust, and Genre of Novel Choices. Once users decide that they want novel music, the question that still remains is how do recommenders pick from the plethora of available options? The participants' responses highlight three distinct insights. First, participants' likelihood of exposure to the music from external sources. Participants mentioned friends, music concerts, social media, and TV shows as some of the sources that led to their selection of novel music. This is related to the phenomena of mere exposure that results in an aroused curiosity and a perceived familiarity towards previously unheard or unknown items [35].

Second, participants interested in the discovery of new music cared about trust in their sources of music. Participants were clear that not every friend, event, or blog is influential in their choices of novel music and that trust and reputations of sources play a crucial role. They mentioned that friends who they believe have good tastes in music, celebrities who they like, and music blogs that they trust, such as BBC Radio One, often led them to explore new artists. Participants' emphasis on trust and reputation highlights why some new artists were more preferred than others.

Third, the genre of novel music plays a critical role. On the one hand, the group of participants who mentioned boredom as a cause to seek novelty sought to change the genre of music (including language for multilingual participants) from what they were currently listening to. However, other participants who sought novel music for sheer joy mentioned exploring new releases in the same genre they were currently listening to. The primary difference between these participants from the previous group was how important they consider music in their daily consumption. Understanding these differences in user consumption therefore can help recommender systems identify if novel music to be recommended is required to belong to a different genre than the user is already listening to.

5.1 Limitations

While we summarize the observations and implications from participants' responses, we also recognize the limitations of this study.

First, we discuss limitations having to do with the participants. Being under observation could have possibly affected the attention of participants who might have selected differently without an individual overlooking their picks. Also, by the nature of their

willingness to participate in this study, participants are likely more comfortable expressing their thoughts than the rest of the general population. This characteristic of participants could differentiate their preferences for novel and familiar music from the rest of the general population. Finally, their recall accuracy of whether they had listened to specific tracks or artists in the past month could impact the accuracy in determining familiar and novel music.

Second, we discuss limitations with the study design. The music language was chosen to be English, limiting any cross-cultural comparison or inference from the results. Also, there is a likelihood of implicit bias due to the selective nature of recruitment that could limit the generalizability of the themes across the general population. Finally, the number of participants is a small representation of a wide and diverse range of music listeners and prohibits us from generalizing to the larger population. However, since the study is exploratory in nature, we do not expect this to harm the external validity of our findings and recommendations with a view to inspire future work.

6 CONCLUSION

Recommender systems have become ubiquitous in many online systems, helping users discover both new and forgotten items. As systems grow and more diverse users join systems, it is becoming more crucial to understand the structure and intention of user-specific needs to provide an engaging and satisfying experience.

We conducted a contextual inquiry-based study to understand participants' actions and intentions while they seek novel or familiar music in online music streaming platforms. We observed participants while they listened to music in their everyday settings and followed up with interviews to expand on factors, such as attention, effort, trust, boredom, and risks, that play a major role in the users' choices of novel or familiar music. We identified the challenges participants faced, such as a lack of trustable sources, an overwhelming number of choices, and the risk of a bad choice, that drive users to stay within the comforts of familiarity and avoid uncertain risk-rewards of novelty.

In order to design effective recommenders, we discussed the results and design implications to emphasize the gap in the assumptions imposed by traditional algorithms on user-specific needs in seeking novel and familiar items. Our results emphasize the goal of recommender algorithms to explore user needs beyond explicit and implicit interactions and include in the models the likelihood of the attention needs of the user, the risk appetite of each user, and the types of novel music users consume in their sessions. Finally, while this work focuses specifically on music and with limitations on the number of qualitative observations, our findings speak to the challenges in mapping user needs for content providers in multiple domains such as news, movies, books, etc.

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