

Understanding Spotify users' perceptions of AI DJ

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Background

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Background – Definitions and motivation

Definitions

- A **recommender system (RS)** is an algorithmic method of recommending content to users on digital platforms
 - On social media, this might be news or stories from people or organizations you don't follow that the RS thinks you might like
 - Streaming platforms such as Netflix or Spotify use RSs to share media that the user might enjoy based on previous watching/listening habits
 - The goal of an RS is twofold: 1. to drive user engagement and retention, and 2. to draw the user's attention to diverse content they otherwise would not know about
- Spotify is a popular, cloud-based media streaming platform that hosts music and podcasts. It continuously innovates with recommendation features such as Discover Weekly, Daily mixes, Daylists, and the new AI DJ

Background – Definitions and motivation

Definitions, continued

- Spotify’s AI DJ is a feature released in February 2023 that utilizes a generative AI vocal DJ to guide users through a series of mixes (a set of 5 songs linked together by a theme) that it thinks the user would enjoy
 - Each mix is introduced by the DJ with a “vibe” (i.e., mood or theme of the mix), genre, focus artist/band, or other categorical label. Sometimes, DJ gives some information about the artist it plays first or last in the theme, and more rarely, mix themes will be accompanied by other non-music related information (e.g., a mix with music from 2019 might be introduced with some information on what happened in pop culture in the same year)
 - As “the very best of Spotify’s personalization,” [\[8\]](#) mixes are curated based on previous listening habits and gives the user the ability to “remix” their experience by triggering a new random mix
- The “**cold start**” issue is what happens when the RS can’t make predictions about what a new user might want to consume because there is not yet any habitual preferences on record

Background – Definitions and motivation

Motivation for doing this research

- Plenty of research exists on RSs, including issues of fairness, trust, and homogeneity effects (discussed in next section), but no academic work exists on researching users' perceptions of DJ
- This topic is worth investigating particularly in Spotify's interest because, as a beta feature, qualitative data on user perceptions will advise future design directions.
 - Down the line, understanding users' thoughts on AI DJ might impact Spotify's overall use and design of its proprietary RSs
- Currently, there is no academic research on users' acceptance of, use and disuse of, use cases for, and emerging behaviors surrounding the use of DJ

Background – Literature review

On how recommender systems work

- Content is recommended to the user based on users’ “explicit or implicit ratings” [2] and consumption patterns [6] to build a profile of the users’ tastes and interests
- At Spotify, RSs aim to strike a balance between recommending content the user is likely to enjoy and recommending “diverse” content for music discovery [1, 4, 6]
- Many studies [1, 4, 6, 7] cite concerns of creating “filter bubbles” with RS use, meaning that users fall into comfortable listening patterns and do not engage in diverse listening experiences
- RSs are mostly focused on meeting technical criteria, but recent work [2] has explored the need for integrating UX practices into RSs to create “excellent musical experiences”
- Spotify’s RS cannot solve the “cold start” issue since it relies on previous listening data to generate recommendations [1]

Background – Literature review

On users' attitudes towards recommender systems

- Studies [\[1, 4, 6\]](#) show that RSs increase content diversity at the individual level while decreasing diversity across user groups
 - RSs tend to be more useful for less adventurous Spotify users who are not looking for novel content [\[1\]](#), which can be explained by the efficacy of the RS of creating a profile of the user's interests
- One study [\[2\]](#) taxonomizes interaction breakdowns with Spotify and Deezer's RSs, and discovers that the RSs “do not sufficiently consider the (sic) desirable aspects” of the user experience
- Concerns for RS use in higher-stakes scenarios (e.g., employment, financial scenarios) include lack of transparency and fairness issues, though these concerns are much lower with Spotify's RS due to lower risks and consequences of the system's recommendations
- Fan-made product reviews [\[3, 5\]](#) of DJ suggest that users like the ease of use and diversity of content, but dislike the “generic” mix themes and low frequency of new music

Background – Research purpose and questions

Goals of this research

- To understand users' perceptions of, attitudes towards, and beliefs surrounding Spotify's DJ, including:
 - Their thoughts on the AI voice of DJ
 - The quality, relevance, and overall satisfaction with provided mixes
 - When they use it, and when they use other features in Spotify instead
- To discover frustrations and/or feature gaps users experience with DJ
- To learn how DJ has influenced general streaming listening habits
- To advise future design decisions for DJ at Spotify, and potentially contribute to the growing body of insights on perceptions of RSs in general

Research gap

- While plenty of research exists on recommender systems, this is the first feature of its kind that uses RS technology supplemented by generative AI vocal guidance
- Anecdotal thoughts on DJ exist in informal online blogs and social media channels, but this is the first qualitative, academic research ever done on this product

Background – Research purpose and questions

Research questions

- RQ1** What are Spotify users' perceptions of Spotify's AI DJ, and does DJ use influence other listening habits?
- RQ2** When do Spotify users use AI DJ, and when do they choose to use different features?
- RQ3** What are Spotify users' perceptions of the generative AI voice that guides DJ sessions?

Background – Methods and recruitment

Research method

Semi-structured qualitative interviews (SSQIs)

- SSQIs were conducted with participants over teleconferencing platforms or in-person in an environment that was comfortable for the participants
- Interviews lasted 20-36 minutes and were guided by an interview script (see [Appendix A](#))
- Interview audio was recorded with verbal consent from participants. Each recording was transcribed, anonymized, and used for later analysis (see Analysis section)

Recruitment methods

- 7 participants were recruited from my personal and professional networks, using social media (Instagram stories and a LinkedIn post) and in-person conversations to verify participant requirements
- All participants met the following criteria:
 - Users of Spotify (free or premium subscription) that have used DJ at least 4 times, the last time being no more than one month prior to the interview
 - No further constraints were set on demographics such as age, gender, education, location, etc.

Background – Methods and recruitment

Participant and interview details

Participant code	Participant met criteria?	Outreach method	Interview medium/venue	Interview length
P1	Yes	In-person	Participant's home	33 minutes
P2	Yes	Instagram	Coffee shop	24 minutes
P3	Yes	Instagram	MS Teams	20 minutes
P4	Yes	LinkedIn	MS Teams	35 minutes
P5	Yes	In-person	Zoom	30 minutes
P6	Yes	Online/other	MS Teams	30 minutes
P7	Yes	Online/other	MS Teams	36 minutes

Analysis



Analysis

- Transcripts were coded using an inductive (bottom-up) approach. The [Taguette](#) application was used to mediate the process
- After iteratively coding transcripts, merging codes, and splitting codes, 47 unique codes (see [Appendix B](#)) were identified relating to mix content, DJ voice perceptions, use cases for DJ, feature requests, changes in overall listening habits, and requests for user control, among others
 - 43 out of 47 codes (~91%) appeared in two or more transcripts
 - 39 out of 47 codes (~83%) were identified in the first two transcripts, suggesting that code saturation was achieved
- As the sole analyst and researcher on this project, I used the following methods to curb interpretive bias:
 - I read and iterated on codes on each transcript a second time as if I were another participant (e.g., I re-read P1's transcript as if I were P3). This enabled me to empathize with differing perspectives by situating each sentiment in another's likely interpretation.
 - I practiced reflexivity by keeping my analysis mindset focused on the fun and playful aspects of DJ, rather than the critical mindset I usually apply to AI-driven technologies as an academic studying trust and ethical concerns in AI and automation

Key findings

1. DJ simultaneously doesn't understand me and knows me better than I know myself
2. I use DJ when I don't want to think
3. DJ has fundamentally changed how I listen to music
4. Is the DJ voice necessary?
5. We want more control



Theme – DJ simultaneously doesn't understand me and knows me better than I know myself

- While most participants shared that they rely on DJ to play familiar music that they already like, all participants believe that DJ misclassifies or misinterprets their music tastes and what they want to listen to
 - “I remember, like, booing him. I feel like I said out loud to my speaker, ‘Why do you think I want that? I don’t want that.’” – **P2**
- Most participants expressed confusion on how DJ builds a profile of their listening habits, especially when mix themes are centered on what each participant typically listens to on a given day of the week
 - “I think it’s funny. He’s like, ‘this is your Wednesday 4pm vibe.’ And I didn’t realize I had a vibe. – **P1**
 - “She [Taylor Swift] is always on, even in my Daylists or other things. And I don’t know where Spotify is getting this information.” – **P6**

Theme – DJ simultaneously doesn't understand me and knows me better than I know myself

- A favorite feature of all participants is when DJ plays songs they have long since forgotten about, which, in some cases, viscerally reminds users of previous life experiences
 - “It will bring up songs buried in playlists that I’ve made that I’ve forgotten about. And I think that’s the most useful thing that it’s done.” – **P5**
 - “DJ in my opinion has done the best job with like pulling music from my past that I have like completely forgotten about.” – **P6**
- Participants tend to rely on other services for finding new music and are disappointed in the low new music discoverability in DJ
 - “I thought it would bring me new music in the way that Discover Weekly or Release Radar do, but it didn’t.” – **P5**
 - “I was waiting for him to get to the, like, “here’s music you never listen to” part – **P2**

Theme – I use DJ when I don't want to think

- Almost all participants expressed that their primary use case for DJ is for when they don't want to decide what to listen to
 - “It takes a lot of anxiety off of the ‘what do I need to do?’ So, it's been a nice crutch.” – **P1**
 - “You kind of want it to pick for you. So that way you're not burdened with the expectations of music that you want to hear.” – **P7**
- Most participants rely on DJ as “background noise” for mundane tasks such as cleaning or driving
 - “In my car on the way to work, I just want to throw on something. So, it's just, like, ‘play music at me.’” – **P2**
 - “I put on DJ X sometimes here and there just to, like, keep my mind busy and keep me hyped up while I cook because I get bored easily.” – **P7**

Theme – I use DJ when I don't want to think

- Some participants use DJ for “passive” listening experiences, instead opting for personally curated playlists, artist albums, artist radios, and other personalization features including Release Radar, New Music Friday, and Discover Weekly for more “active” and engaged listening sessions
 - “If I don't enjoy the fact that you're choosing for me, it means that I apparently do want to choose” – **P4**
- A commonly mentioned downside of DJ, according to most participants, is that the content it serves up can get repetitive and overuse of DJ can feel stagnant
 - “It's like when you eat the same food too much, you get kind of disgusted with it.” – **P7**
 - “It's just repeating the same things...I've noticed myself every single time his voice comes up [skipping all the songs], just trying to get to the next song that I like.” – **P6**

Theme – DJ has fundamentally changed how I listen to music

- Some participants see DJ as a modern equivalent/replacement to FM radio and/or past-generation radio alternatives such as Pandora
 - “It’s provided kind of a radio replacement, like I haven’t listened to FM radio in like a decade.” – **P4**
- Some participants expressed concern that they are growing complacent in their listening habits, though they don’t see that as a necessarily bad thing
 - “I almost wonder if I’ve gotten, like, more complacent in what I listen to, just because it’s so easy to throw on.” – **P1**
 - “Sometimes just not having that decision be your own feels a little weird, but it’s not that it’s bad.” – **P4**

Theme – DJ has fundamentally changed how I listen to music

- Most participants have fears of inadvertently influencing DJ's algorithm by listening to things they wouldn't normally listen to, even if only for a few seconds. This has resulted in diminished intentional exploration of new music and, in some cases, the use of other platforms such as YouTube to explore new music
 - “I was thinking the other day of like, how quickly it picks up on something new that you listen to. Which is kind of annoying because I was going through some movie soundtracks, and now I'm just getting, like, inundated with all sorts of stuff I don't actually want to listen to...sometimes when I'm searching and playing stuff I have a thought, like, ‘Is this going to screw up my DJ?’” – **P1**
 - “You know that the algorithm is like watching now, like in a more direct way than it was before.” – **P4**
- This has translated to data privacy concerns for some
 - “It creates so much data that we can basically recreate like a psychological profile and sell that to the government so that they know if you're gonna be able to rent a house or not...it sounds really far fetched until it happens.” – **P4**

Theme – Is DJ X necessary?

- The DJ “voice” (named **DJ X**) received panned reviews; some love DJ X, while others really dislike him
 - “He’s the distilled essence of a radio DJ. It’s not a good thing. It’s also not bad, it’s just funny.” – **P4**
 - “The voice is pleasant. And the experience of hearing the voice is great. It’s like, ‘We’re here for you.’” – **P5**
- Most participants were shocked when they were first greeted by name by DJ X and off-put by the intimacy
 - “It is also really off-putting when he says your name...it’s like, ‘I don’t know you dude. I never met you!’” – **P2**
 - “I remember being absolutely shocked by the voice when it starts talking and its like, ‘hi, [participant’s name].’ I’m like, oh my gosh, this is a real human in my phone.” – **P6**

Theme – Is DJ X necessary?

- Many participants find DJ X to be intrusive/disruptive, and a few participants don't believe that the vocal guidance is necessary at all
 - “I don't know that I need somebody to be talking to me that isn't even a human in the first place. Okay, like, ‘here's a new song for you.’ It's like, okay, what's next, a commercial for Chick-fil-A?” – **P5**
 - “It honestly gets frustrating...after listening for a while I almost stops the listening process.” – **P6**
- However, some participants find a base form of companionship in DJ X, even going so far as to feel bad when skipping songs
 - “Maybe this sounds a little lonely, but if I'm ever in a car ride by myself, I just like to hear another voice.” – **P3**
 - “I don't know why I care what an AI thinks about my music taste, but I do. I do not want to hurt its feeling either.” – **P1**

Theme – We want more control

All participants expressed a desire to exercise some control over DJ

- **G'day, DJ:** Like how iPhone users can change Siri's voice and accent, most participants would like to be able to change DJ X's voice for an added layer of personalization
 - “I wish you could change it. A bit more customizable. Like, maybe I want some Irish guy talking to me. Or an Australian.” – **P1**
- **Ask me:** Some users want the option to be able to deliberately set the themes/moods/vibes for mixes ahead of time while still letting DJ select the songs in each mix
 - “Say I am cleaning the house on a Saturday. [I'd like to] type in a prompt of like what I'm doing and maybe it can give me some mixes that surround that.” – **P3**
 - “Sometimes I think I wouldn't use it, but there would be other times where I actually wanna edit that specific playlist or have it generate more music from a certain genre or artist.” – **P6**

Theme – We want more control

More ways users want to control DJ

- **I don't like this:** Most users want more influence on “blacklisting” songs that appear in DJ sessions by, for example, downvoting or disliking songs in the interface
 - “Something with Spotify I’ve noticed is it doesn’t necessarily take into account music that you don’t like...say you don’t like a certain artist, I’ve struggled getting rid of those. If I could say no to this genre on this mix or artist on this mix, I think I’d have just in general a better time.” – **P6**
 - “Sometimes I feel like certain things that I’ve skipped a couple times, it keeps bringing it back.” – **P1**
- **Don't change:** Most users dislike when DJ switches the vibe on a mix they are really enjoying, and want an option to keep a mix going for as long as they specify
 - “I want this and for it to be more than 5 songs” – **P4**
 - “I didn’t need to change the vibe” – **P5**
 - “I just wanna keep hearing [this mix] and then it’ll be like, ‘alright, switching gears’” – **P6**

Discussion

Returning to the research questions
Implications for Spotify



Discussion – Returning to the research questions

RQ1 What are Spotify users' perceptions of Spotify's AI DJ, and does DJ use influence other listening habits?

Participants in this sample generally like DJ as one of many personalization options available on Spotify. Participants felt they could entrust DJ to play familiar music, but sometimes wonder where DJ is getting its information from, as evidenced by bad mixes and uncharacteristic recommendations. Using DJ, participants experience slight feelings of complacency, enjoy the platform as an alternative to legacy options such as FM radio and Pandora, and, most interestingly, are more conscious of their exploration habits on Spotify in fear of influencing the algorithm in an unfavorable way.

RQ2 When do Spotify users use AI DJ, and when do they choose to use different features?

Spotify users rely on DJ for serving familiar music with the occasional surprise, most importantly, being reminded of music they've long forgotten about. They use DJ when they don't feel like actively engaging with music, or when performing rote tasks such as driving or cleaning. When DJ doesn't work, participants in this study seek alternative personalization features such as Discover Weekly or Release Radar. To avoid influencing the algorithm, some users explore new or unfamiliar music on other platforms such as YouTube.

RQ3 What are Spotify users' perceptions of the generative AI voice that guides DJ sessions?

While some users enjoy DJ X's voice and see something of a friend in him, others find his presence unnecessary and disruptive to the listening experience. Most participants in this study would like the option to customize his voice for a more personalized and enjoyable listening experience. Some participants found the level of intimacy that DJ X expresses to be extraneous and even off-putting.

Discussion – Implications for Spotify

This study results in several implications for the engineers and strategists at Spotify as they continue to improve the DJ experience:

- User controls, outlined in [We Want More Control](#), should be explored and perhaps piloted with targeted groups of users. These controls should be optional, since requiring this amount of effort to use DJ, for some, might overpower the utility of having DJ decide for you.
- This study shows that DJ has provided a degree of insight into the power of Spotify's acquisition algorithm that general-purpose users have never thought about. Thus, it becomes necessary for Spotify to elucidate when and how listening data is collected and how profiles of users' listening preferences are constructed.
- Further, users should have more clear direction on how to explore music in Spotify without fear of influencing the algorithm so that they do not feel tempted to take their exploration to other platforms such as YouTube.
- Finally, some experimentation is required to find the proper balance of DJ X's presence. This study has shown that participants in this sample find him disruptive and intrusive, so some effort should be put into discovering how to make DJ X more engaging and more pertinent to the overall DJ experience.

Limitations and next steps



Limitations

- The most obvious limitation of this study is my use of selective/convenience sampling. All participants were deliberately chosen from my own social circle and could thus be seen as an extension of my own beliefs. Further, all participants reside in the United States, which was the first country to receive access to the beta version of DJ. Future work should consider DJ users in countries that only recently got access to DJ to determine whether cultural differences have influence on users' perceptions of the feature.
- While I feel somewhat confident that I've achieved code saturation in this study, I do not believe that only having spoken to 7 participants translates to full meaning saturation. Additional work with larger and more representative samples is necessary to reach meaning saturation.

Next steps

- As stated, Spotify should investigate some of the [user control requests](#) expressed in this study. I have high confidence that everyone will benefit from having the option to exercise more control on DJ, and strategists at Spotify might benefit from testing experimental and/or beta features with targeted users.
- The sample selection and size limitations of this study warrant further exploration with a broader, more diverse, and more representative sample. Thus, this study serves as a pilot that may inspire more of the same type of research.
- The theme I found most interesting and most worth investigating in future work is how DJ users are afraid of influencing DJ by exploring new music. Participants notice more clearly than ever before how quickly DJ's acquisition algorithm "picks up on" the things they listen to but are frustrated that they cannot easily untrain the algorithm if they never intended for something to influence their listening profile. This lends itself well to further research and could be examined from theoretical lenses related to automation control, algorithmic fairness, and AI explainability/transparency.

References and appendices



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Appendix A – Interview script

Interview guide: Spotify users' perceptions of AI DJ

Intro (5 minutes)

- *Introduce yourself & why you're doing the research (the purpose, in brief)*
 - Hi, my name is Alex (moderator). This interview is for a class project, where our goal is to discover Spotify users' perceptions of and uses for the new AI DJ feature (project purpose). Thanks for being able to participate! I am interested to learn from you about this topic!
- *Cover confidentiality, right to withdraw, consent to record*
 - A few things before we get started...
 - Ask for verbal consent for the interview
 - Is it ok for me to record this interview? It will help me remember the details of what we talk about so we don't have to take detailed notes now.
 - I want to assure you that what you share with me today will be anonymized in any findings reports from this research. That means I will not use your name or photo associated with any comments you make.
 - I also want to let you know that you can end this interview at any point, or skip any question you don't wish to answer.
- Clarification of definitions: DJ voice, mixes, "the algorithm" (regarding personalization of content)
- Any questions before we start?
- *[start recording]*

Warmup/background questions (10 minutes)

- On general Spotify use and listening habits/preferences:
 - How often do you use Spotify?
 - For how long have you used Spotify?
 - Do you use any other media streaming services for music and/or podcasts? How does Spotify compare for you?
 - How do you organize and search for music on Spotify?
 - How interested are you in finding new music on Spotify? Do you intentionally seek out new music? If so, how do you do this?
 - What factors (such as emotion, setting, etc.) influence what music you decide to listen to?

Appendix A – Interview script

Main questions (20-30 minutes)

- On AI DJ impressions over time:
 - When did you first start using AI DJ?
 - How often do you use AI DJ, per week/month?
 - Can you explain your initial thoughts and experiences with AI DJ when you first started using it?
 - Have these experiences changed over time? How so?
- On AI DJ use cases:
 - When do you use AI DJ? (e.g., driving, at work, etc.)
 - Do you have an example of when AI DJ was just the thing you needed?
 - When do you choose to use different features in Spotify instead of DJ, such as:
 - Personal playlists
 - Other recommendation systems like Daily Mix, Discover Weekly, Release Radar, track/album/artist radios, etc.
- On the AI DJ itself:
 - What are your thoughts surrounding the AI DJ, i.e., the voice?
- On mix satisfaction:
 - What types of mix themes do you get?
 - Do you feel these mixes align with what you want to hear?
 - Tell me about a time when the mixes you received were exactly what you wanted, if applicable
 - Tell me about a time when the mixes you were provided didn't feel representative of you or your interests
 - Does the AI DJ have a good handle on you and your preferences, in your opinion? What does it get right, and what does it get wrong?
 - What do you do when you receive bad mixes and/or recommendations from DJ?
 - What, if anything, would you change about the service?

Appendix A – Interview script

- Closing questions
 - In general, how do you think AI DJ has changed your listening habits, if at all?
 - What are your future thoughts/fears/hopes/desires for AI DJ, or similar technologies in Spotify?

Closing (5 minutes)

- Any final thoughts or feedback before we wrap up?
- Thank you for participating! This was very helpful for our research project.

Appendix B – Codebook

CODE	COUNT
Another feature is better than DJ	11
DJ decides for me	21
DJ doesn't understand me	14
DJ is better than another feature	2
DJ knows me more than I know myself	8
Content – I wouldn't have put those together	2
Content – don't give me Taylor Swift (joke code)	3
Content – familiar music	10
Content – reminded of old music	14
Content – short mixes	6
Content – stagnancy and repetitiveness	8
Content – time of day	7
Content – variety	6
Content – vibes	3
Crossfade	3
Listening habits – DJ is the new FM radio/Pandora	3
Listening habits – I would be more deliberate if not for DJ	2
Listening habits – complacency	5
Listening habits – fear of influencing DJ	8
New feature – DJ talks weather, news	2
New feature – artists playing near you	1
New feature – subtitles	1
New feature – visualizer	1
Privacy concerns	4
Skip songs / the button	13
So many options to pick from	7
User control – ask me	6
User control – customize voice	11
User control – dislike tracks	7
User control – make mixes longer	10
User control – select mix themes	3
Voice – I dislike the voice	8
Voice – I like the voice	6
Voice – affect and realism	10
Voice – don't want to upset my friend	2
Voice – greeting by name	7
Voice – intimacy	7
Voice – intrusive	5
Voice – say less	3
When DJ fails me	14
Why I use DJ – busy work	6
Why I use DJ – companionship	3
Why I use DJ – driving	12
Why I use DJ – easy, no effort needed	10
Why I use DJ – find new music	5
Why I use DJ – inspiration for what I want to listen to	5
Why I use DJ - surprises	3

TOTAL: 47 codes