

Assignment M2

Koushik Pernati

kpernati3@gatech.edu

Abstract—When users want to listen to music, one widely used interface is Spotify, which is a media service provider that allows users to stream and listen to music on devices. The goal of the project is to understand users' tasks when they are listening to music and redesigning the search functionality of the Spotify interface to make it easier for the users to search for songs on mobile devices. Going through the four main steps of a design lifecycle: needfinding; design alternatives; prototyping; and evaluation, will make it easier to achieve the goal.

1 NEEDFINDING EXECUTION ONE: NATURALISTIC OBSERVATION

The first needfinding method that was executed was naturalistic observation. I did this needfinding method in my home due to restricted circumstances caused by Covid-19. The users that I observed are friends that visited my home. I captured notes on these users when they were playing video games. I noticed that the users used devices like Amazon Echo dot to listen to music. Some said the name of the song to play, I wrote down what one user said: “Alexa, play the song Power by Kanye West”. I wrote down that the “users did not specify which app for Alexa to use” which means that the devices might have been configured with some music media app. In my notes, I captured that “users repeated this step for different songs 14 times”. There were “5 people” that were observed in the room with the TV. In this observation, I wrote down that their “hands were busy with playing video games via Xbox controller”. They “used their mouths to play the songs”. In my notes, I have that the “users would take turns talking to the Amazon Echo dot”. “Users stopped songs in the middle and asked Alexa to play different songs.” I wrote down that the users listened to the music only until they played the video game, it was about “48 mins”. After they finished playing on the Xbox, they didn’t interact with the Amazon Echo dot. The double quotes in the sentences above are raw notes that I captured from the naturalistic observations.

Some of the takeaways were that the users' contexts and environments contributed to what users did and actions they performed when listening to music. I summarize that listening to music might not be their primary goal as what I had believed earlier. It might be one task users are doing but the primary cognitive load of the users might be something else. Users might not want to be restricted to just haptic requests like using hands to play music on devices but might want to use auditory requests to search for songs to play. I noticed in the observation that users didn't specifically turn off the Amazon Echo Dot after they stopped playing, rather it seems that the Echo Dot was always on. This can summarize that users might want interfaces to be easily accessible at all times to reduce the distance in the gulf of execution. The data that this needfinding method produced was useful in understanding what users do when listening to music in their natural context. I was able to get a broader understanding of the problem space on the task of listening to music rather than focus on specific interfaces.

There were concrete steps that I took to avoid confirmation biases in this needfinding method. I had my notebook and wrote down my goals for the needfinding method at the top of the sheet. Instead of having all questions written down, I tried capturing as much quantitative data as possible. I had numeric data which can be objective data which is easy to compare. Even though I captured the data in a numeric fashion and felt that the data I captured was useful, I did have a feeling that I might have missed out on data that could have helped generalize the problem space. Something I might want to do if I do this needfinding approach again is to have a partner that can help in noticing observations with me as it won't create a tunnel vision in collecting data. Writing down all information that is occurring and comparing with partners will remove confirmation bias that still exists.

2 NEEDFINDING EXECUTION TWO: PARTICIPANT OBSERVATION

The second needfinding method that was executed was participant observation. I did this needfinding method in my home as well. In this method, I was a user of the Spotify search functionality interface. In this needfinding method, I was listening to music when I was playing blitz chess on chess.com. These are raw notes in my notebook from this observation.

“Unlock phone fingerprint. Clicked on Spotify app. Click search bar, then enter: Trap music. Results returned are songs. First attention to songs. Then click See all playlists. Felt satisfied with the results. Eye focused on the name section of each choice for results. Click on Trap Nation. Click Shuffle Play. Got Ad. Was not happy about Ad. Another Ad came right after. After add, music started playing. Adjusted volume by lowering it. Stopped looking at phone. Opened chess.com and started playing. Wanted to skip song in middle of chess game. Phone locked but clicked next song button on lock screen. New song started playing. Focus back to chess game. Songs played were half listened to. Skipped song, didn't like lyrics. Play another chess match. Middle match, skip song. End playing chess match. Stop music by clicking pause button on lock screen.” The double quotes in the sentences above are notes that I captured from the participant observation.

Again, in this needfinding method, one takeaway is that the users' contexts and environments contribute to what users do and actions they perform when listening to music. When I was listening to music, my primary goal was to play chess. I wanted music to be played in the background when I played chess. Another key takeaway that I saw from my own experience was that I was impatient with the Ads being played on Spotify because it prolonged me from starting my chess games. I also had to stop my activity of playing chess to perform physical actions with my hand of clicking on the touchscreen of my phone to skip songs. I understood what are those specific processes that users might perform on mobile devices to search for music to listen to. After understanding those actions, the takeaway was that I wanted the gulf of execution to be narrower, so that I can perform my other tasks faster.

The bias that I initially anticipated was recall bias. This bias can potentially happen when I participate in the activity and don't recall how I felt or remember the physical actions I performed. The concrete step that I took to avoid this bias was by writing down every physical action I performed in the Spotify interface as I was doing it as well as writing down my feelings for responses given by the interface while they were happening. This way I had concrete details that could test my beliefs and expectations empirically. I felt that I avoided this bias successfully as well as collected the right data for this needfinding method. I

wanted to focus more on the tasks and subtasks of the data inventory for this needfinding method and was successfully able to get more data than I hoped for.

3 NEEDFINDING EXECUTION THREE: SURVEY

The third needfinding method that was executed was the use of surveys. When I executed the survey needfinding method, I was able to get a larger number of responses and collect more data. I created a survey in the PeerSurvey tool called “Listening to Music on Media Platforms” for users of this survey to be students in the HCI course of Spring 2021. There were a total of 50 responses for this survey with a broad range of answers. The raw data is presented in JSON format and can be viewed in *Appendix: Survey Responses*. The survey results summarized show that more than half of the participants (27 participants) of the survey were in between ages 18-29. 40 survey responses showed that users listen to music on an average of 1 - 4 hours a week. 48 responses out of 50 said that they are performing some other activity like working, exercising, or reading when they are listening to music. Almost everyone in the responses for the survey said they use a phone or a computer for listening to music. And more than half of the responses for what interface they use to listen to music is Youtube and Spotify. More than half the responses to the survey said that they were either satisfied or highly satisfied with the appearance, interaction and results of the search functionality feature in the media interface they use. The suggested improvement for search functionality on media interfaces questions received the most diverse answers ranging from none to making results more personalized.

The main takeaway I got from the responses of the survey is that listening to music has never been the primary goal of the user in this problem space. The primary goal has been working, exercising, reading or performing another activity. Listening to music is more of a secondary goal even when the users are in different environments. I was able to understand that users of music media platforms typically are satisfied with the search feature appearance and interaction as well as results. However, from reviewing what can be improved, it seems that the search results can be more personalized to the users favorite music genre as well as reducing the gulf of execution with the actions that users take. Few suggested improvements mentioned that having voice search would

be beneficial with music media platforms. This is a key takeaway for me as users want to see multiple modalities for music media platforms.

The biases I initially anticipated for this survey were observer bias and voluntary response bias. Observer bias occurs when a question is phrased in a particular manner that elicits the answers the survey wants to hear. I feel that I avoided this type of bias successfully by reviewing my survey questions to make sure that there are no leading questions with its answer choices. Voluntary response bias can occur when the survey members are self selected volunteers. This might have been a hard bias to avoid because this survey can be answered by anyone in the HCI course and those that felt strongly about the survey topic would answer creating a risk of oversampling extreme views. I limited this by creating a survey title that was broad and generic to the concept of listening to music compared to mentioning Spotify as the interface the survey talks about. The way the course is structured also helped with avoiding this bias because students get 0.5 points of participation credit for helping other students with their project participation. Students likely took the survey more for the participation points rather than having extreme views on the subject of the survey. If I could do this again, I would try to get individuals that listen to music as their primary activity because from reviewing the results, it seems listening to music is not really individuals primary goal, listening to music is more of a secondary goal.

4 DATA INVENTORY

4.1 Who are the users?

This is a data inventory item that deals with ages, genders, and levels of expertise. From the needfinding method of surveys, I collected data on the ages of the users who listen to music on social media platforms. The ages ranged from eighteen to sixty four. This relates back to the problem space to identify the users as people who would use Spotify search functionality could be ideally anyone above eighteen years of age. Gender was one piece of this data inventory that I did not collect. Gender does not play a role in my problem space because search functionality on Spotify via phone affects all genders. I should have asked a question on my survey for the expertise of users for using music media platforms. This can help identify if my design will need to help novice users or advanced users.

4.2 Where are the users?

This data inventory deals with the environment of the users. From the naturalistic observation and participant observation we see that the users were performing the task of searching and listening to music in my home. So the location of where the users might use search functionality of Spotify might be at the users home. Looking at the survey needfinding method, we get a more clear picture. Users search for songs when they are working, exercising, reading, etc. This identifies that the environment could not only be their home, but workplaces, gyms, restaurants, etc. This helps relate to the entire problem space as where users use the Spotify app can be anywhere they listen to music.

4.3 What is the context of the task?

This data inventory item is about understanding what else is competing for users' attention. In every needfinding method, a key takeaway was that searching and listening to music was never the primary goal of the user. The user was performing other tasks when they wanted to search for music. In the naturalistic observation, the users that were playing video games and listening to music were playing games on the Xbox and that was using their cognitive load and competing for users attention. When I was the user in the participant observation, playing chess was competing for my attention. In the survey responses, we saw that there were many activities that were competing for attention from the users like working, exercising, and reading. We can relate to the problem space to say that users activities will be based on their primary goal.

4.4 What are their goals?

This data inventory item talks about what are the users goals and what they want to accomplish. When I did participant observation, I wanted to quickly play songs and was not happy with Ads because it delayed me from playing chess. I wanted the process of searching for songs and playing them to be faster. In naturalistic observation using auditory modality, users were able to play songs fast even when they were playing games. The survey results show that more than half the users were satisfied or highly satisfied by search results on media platforms. In the context of the problem space, we want the user to be able to search for songs in Spotify very fast.

4.5 What do they need?

This data inventory is focused on the physical objects or tools that users need to accomplish their goal. From naturalistic observation we saw the use of Amazon Echo dot to play music, in participant observation I used my phone to search for music in the Spotify interface, and responses from surveys show that users need a phone or computer to search and listen to music. In relation to the problem space, this data inventory item requires a device that can access the Spotify interface. From our original goal and problem space, the users will need a mobile device with the Spotify application installed. I was able to gather the data for this inventory item successfully with the three needfinding method executions.

4.6 What are their tasks?

This data inventory is about what users are doing physically and cognitively. In the naturalistic observation, users are physically using their voice to talk to the Amazon Echo dot to search for songs to play and cognitively they are thinking of the song they want to search for. In participant observation, I was physically searching for songs using my hand to enter words within the touchscreen keyboard. The survey needfinding method doesn't ask users what they physically do to search for songs and it could be something I can add next time I do a survey. From the problem space we see that having physical interaction with the phone via hands touching the touchscreen keyboard as well as a song in mind to search for is needed.

4.7 What are their subtasks?

This data inventory item is about specific subtasks to accomplish the tasks mentioned. There were no particular subtasks that were collected from the naturalistic observation since it was straight forward just talking with Alexa. In participant observation, subtasks that I performed were stopping and skipping songs on my phone by touching the touchscreen on my screen locked phone. This was not directly held with the task of searching for songs but plays a role if I want to look for the next song. Survey needfinding method does not focus on this data inventory item. In the problem space, a subtask data inventory item can be how to deal with actions such as stopping or skipping a song once you have already searched for a song to play.

5 DEFINING REQUIREMENTS

From the requirements drawn out of the data inventory, we can determine the requirements of the interfaces in terms of the functionality, usability, learnability, and accessibility. The functionality requirement the search feature of Spotify application must include is providing the correct songs that users search for. The usability requirement is the ability to interpret auditory modality for song requests. Users should be able to voice search for songs in the Spotify interface and the interface should be able to successfully interpret the request and play the song. Learnability goals that the interface must meet is that novice users should be able to search for songs really fast. There should be no hurdles or confusion for users on how to search for songs. The Spotify search functionality interface should be used by all users with a mobile device and has the Spotify application installed. Since we want the users to be able to search via auditory request, users must be able to speak. Ideally, I want to reduce time for novice users to search for songs in Spotify thus learnability and usability requirements will take higher priority. The metrics I would use for determining success of the interface is the amount of time it takes a user to search for songs on the Spotify interface as well as quantitative metrics on the number of actions a user takes like a user navigating 5 buttons inside the Spotify app. I want to reduce the gulf of execution by comparing metrics in a quantitative manner.

6 CONTINUED NEEDFINDING

The next iteration of needfinding I would engage based on initial experience is survey needfinding method. I found surveys to be extremely valuable as they provide large amounts of data in a short amount of time. One remaining question that could benefit from additional needfinding is to identify which feedback: haptic, visual or auditory users prefer the most and is it related to the environment of the user. Questions that arose in the initial needfinding exercise that I would like to get more data on, are determining what the expertise of a user has with Spotify and what type of tasks users perform with music media interfaces when they want to stop listening or skipping a current playing song. An exercise I would perform is to engage and discuss with other individuals to see what is important to them when they are searching for music and incorporate that relevant information as questions in the survey.

7 APPENDICES

Appendix: Survey Responses

[[{"id": "1612736327746", "text": "Select your age:", "answers": ["18 - 29", "30 - 39", "40 - 49", "18 - 29", "30 - 39", "40 - 49", "18 - 29", "18 - 29", "18 - 29", "18 - 29", "50 - 64", "18 - 29", "30 - 39", "18 - 29", "30 - 39", "18 - 29", "30 - 39", "18 - 29", "18 - 29", "30 - 39", "18 - 29", "18 - 29", "30 - 39", "30 - 39", "18 - 29", "30 - 39", "40 - 49", "40 - 49", "18 - 29", "18 - 29", "18 - 29", "18 - 29", "50 - 64", "18 - 29", "18 - 29", "30 - 39", "30 - 39", "18 - 29", "18 - 29", "30 - 39", "18 - 29", "30 - 39", "30 - 39", "30 - 39", "18 - 29", "18 - 29", "18 - 29", "30 - 39", "18 - 29", "30 - 39", "30 - 39"]}, {"id": "1612736354364", "text": "On average, how many hours a day do you listen to music?", "answers": ["5-7", "1-2", "1-2", "5-7", "3-4", "5-7", "More than 7", "3-4", "3-4", "1-2", "1-2", "3-4", "1-2", "3-4", "1-2", "3-4", "3-4", "3-4", "0", "1-2", "1-2", "5-7", "1-2", "1-2", "1-2", "1-2", "3-4", "1-2", "3-4", "5-7", "1-2", "3-4", "0", "3-4", "1-2", "3-4", "1-2", "5-7", "5-7", "3-4", "1-2", "3-4", "3-4", "3-4", "1-2", "1-2", "1-2", "1-2", "1-2"]}, {"id": "1612736459304", "text": "What tasks, if any, do you perform when listening to music?", "answers": ["Schoolwork and leisure web browsing", "Reading news", "homework or job", "Everything: writing emails, doing homework, cooking, reading", "I listen to music during work. I have a headset on at my desk and use music to help me concentrate by drowning out other noises.", "Cooking, driving, working", "Studying, working, cooking, exercising, doing nothing and just listening to music", "Driving, exercising, work", "taking a shower, relaxing, doing house chores, in my car", "Walking, jogging, working out", "Reading", "homework", "household tasks, reading", "Programming, reading, commute", "Cooking, driving, casual reading", "working, studying, cleaning, cooking", "Coding", "Work, exercise", "Work, Wood working, Exercising", "none", "Work, assignments, driving", "Programming", "Working out, doing work, studying, cleaning, making food, relaxing", "Cooking, Driving, eating, walking.", "Coding, doing chores, cooking, exercising", "Working, Doing homework, Cooking", "Not specific sometimes more tasks and sometime no tasks just listen music", "Coding , studying , cleaning", "reading", "Working, Studying, Driving", "Homework, Work", "Typically when I'm doing work for school or my job or at the gym", "work, study, and general computer stuff", "na", "working, studying driving running", "Cooking, Working", "study, work, exercise", "I am

usually at work- so maybe responding to emails, driving, writing a report, reading", "Work out, work, run, play games", "workout", "homework, driving, working", "Working, Walking, Driving", "Study, work, exercise, house work", "Work", "Driving, Walking, Working on a computer", "Usually while coding.", "drive, play with daughter, work, prep food", "Exercising", "exercising, cooking", "work, cooking"]], {"id": "1612736520398", "text": "What devices do you use to listen to music?", "answers": ["Desktop PC, Laptop, Phone", "Desktop computer", "PC", "Phone, computer", "iPhone or sometimes I stream music on my laptop", "iPhone, HomePod, Computer", "Smart phone, laptop computer", "Smartphone, laptop", "smart speaker, mobile phone and car", "iPhone, apple watch", "Iphone", "phone", "iphone, alexa", "iPhone, Laptop", "Laptop, iphone, Google Home", "Echo Dot, phone, laptop", "mobile phone", "iPhone, Macbook", "Almost exclusively my phone, occasionally my tablet.", "laptop / desktop", "Headphones and speakers", "iPhone", "Android phone, Google Home, bluetooth speaker, laptop, Spotify", "Phone", "iPhone, Macbook", "Laptop, Phone", "phone, computer", "iPad , laptop ", "phone", "macbook, iphone, earphones", "Phone, Computer", "Computer and phone", "desktop, phone", "smartphone if i do less than 1 hour", "phone computer", "Mobile phones", "airpods/phone, computer", "my phone + headphones, my laptop, my phone + car speakers, speakers", "laptop, phone", "smartphone", "Android phone and Laptop", "Android, Computer, Car", "phone", "iPhone", "iPhone, Desktop", "mobile, laptop", "smartphone, laptop, iPad", "iPhone", "phone", "phone, alexa, desktop"]], {"id": "1612736606893", "text": "Which music media platforms, if anything, do you use to listen to music?", "answers": ["Youtube; Spotify; iTunes", "Youtube", "Youtube", "Youtube; Spotify", "iTunes; Other", "iTunes", "Youtube; Spotify", "Youtube; iTunes", "Youtube; Spotify", "Youtube; Spotify", "Other", "iTunes", "Youtube; Spotify", "Youtube; Spotify", "Spotify", "Spotify", "Youtube; Spotify", "Other", "Spotify", "Spotify", "Youtube; Spotify", "Spotify", "Spotify", "Youtube", "Youtube; Spotify; iTunes", "Youtube; Other", "Youtube", "Youtube; Other", "Youtube", "Youtube; Spotify", "Youtube; iTunes", "Youtube; Other", "Youtube", "Youtube; SoundCloud", "Spotify", "Youtube; Other", "Spotify", "Spotify", "Youtube; Spotify; Other", "Youtube; Other", "Youtube; Spotify", "Youtube; SoundCloud; Other", "Spotify", "iTunes", "Youtube; Spotify", "Other", "Spotify", "Youtube", "iTunes", "Youtube; Other"]], {"id": "1612736660512", "text": "If you chose \"Other\" to the

[illegible]

Satisfied", "Satisfied", "Satisfied", "Highly
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top result and things related to it. Other found things are smaller and harder to spot in the search window","None","None at the moment","They work fine to me.,"no specific suggestion","Better filters","could be more convenient","Integration of voice search","I would recommend some syncing potentially with your social network to be aware of trends in your friend groups","A lot of times, songs are marked as removed from my library because some property (such as album picture or artist name) was adjusted. I need to lookup the song and add it again.","They have user playlists, many of which have songs that have been taken down. If one could weed those out it would be good.","not sure. maybe more accurate keywords","none","The search results are displayed only if the search term is available in the album name or description. The app can make sure to include all relevant details of the song to produce better results","none","Sometimes I wish that the search results took into consideration my music tastes- ex. I listen to predominately pop or rap, if I search for a keyword in a song that appears in different genres I would want to see the genres I listen to the most first.","not sure which response correlates to which platform; I chose the responses respectively. I would improve Youtube's categorization of music, as well as better identify if it was uploaded by the original artist or another user","play music by mood and time","Be able to Shazam to search for songs within Spotify. Better search for when albums and songs have the same name.","In the case of SoundCloud, sometimes it is very difficult to find old episodes of podcasts. I have to go to the artist, and then scroll down a long list in order to find them, typically.","Podcast search could be improved to show similar things","None","I can not think of any improvements.","Playlist suggestion can be localized as per the country, rather than the whole world. For example, the English songs in top charts of India is different than US or UK","Meets my needs sufficiently enough at present","Show not only direct search results but also related content as well!","na","Nothing"]}]