MUSIC ENCOUNTER: EXPLORING SOUND AND MUSIC AS PRIMARY MEANS OF INTERACTION IN GAMES

Qingyu Cao

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Professor John Sharp

Parsons School *of* Design

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Abstract

Music moves people. Its kinetic power can affect human emotions and behaviors, and people can feel the bonds between people under certain circumstances across different cultures. In order to explore how music and sound can benefit human relationships and emotions, the author developed an open-world role-playing game: Music Encounter which sets in a musical fantasy world. The goal of the game is to use music and sound to connect and match people, and to provide people with a good interactive and social experience. This paper aims to explore the influence of using music and sound as a major means of interaction between people and people, as well as people and the environment, on people's overall experience.

Background

Can music and sound help to build connections between people, and help people find their partners, friends, or even lovers in a more efficient and interesting way? How will musical communication be different from traditional text, video, or voice communication? Can music and sound help to match people like a dating/social app? How would open world 3D games fit into these interests? To find answers to these questions, the author wrote this paper, which aims to explore the influence of using music and sound as a major means of interaction between people and people, as well as people and the environment, on people's overall experience.

Music is a medium that appeared in the early development of human society and is ubiquitous across different cultures and regions. From ancient times to the present, there are traces of music participation in many human activities, such as sacrifice in religious, physical labor, funeral, intercourse, recreational activities, and so on. Music and sound can affect people in various ways. Studies have shown that some aspects of music are beneficial to human survival, leading to adaptations that enhance musical behavior. For example, the emotional and social power of music is very powerful. Chorus can unite people and make people feel a sense of resonance. Music is widely used in some collective labor activities, such as construction. Music can also affect people's mental activities, and change people’s emotional feelings. Therefore, people can use music to improve or adjust the physical and psychological functions of their bodies and achieve the goal of curing diseases and improving health. While music around the world varies greatly in structure, pitch, and rhythm, music on Earth shares a common foundation. The reason that people can recognize music and be affected by it is that music is possibly related to rhythms and sounds inside human bodies, such as

heartbeat and breathing.[1] Generally speaking, music has a wide range of uses, and it acts like a universal "language" of human beings.

In addition, studies have proved that there are universal patterns in musical preferences. Although there are individual differences, people with the same personality/hobbies are likely to listen to the same type of music. People who like to listen to the same singer/style of music will also have a common topic based on the music they like, making it easier for them to make friends. A 2018 research studied people's music-related Facebook likes and music listening habits. The researchers discovered that the participants' musical preferences indicated some of their personality traits.[2] For instance, the study mentions that "people with higher openness were more likely to enjoy sophisticated music (complex, dynamic genres like classical, opera, and jazz), and to dislike mellow music (slow, relaxing genres like R&B and soft rock) and contemporary music (rap, electronic, dance, Europop and Latin)." Moreover, people can also understand the same emotional expression from different music. A 2012 study demonstrated that the dynamic character of these five emotional expressions: happy, sad, angry, scared, and peaceful is universal across cultures. Those expressions also share a similar dynamic profile both musically and in action. [3]

Method

The author wants to explore the interactive and social experience that music and sound can bring to people through games. Since in the current electronic age, people, especially young people, interact with others mainly through the Internet, so creating a game will be a good test method for the current research topic. At the same time, according to surveys, many young people like to play games and make friends through video games. From a 2022 U.S. survey, 36 percent of video game players come from the 18 to 34 age demographic, and 24 percent of video game players' age are under 18. [4] In a 2014 national survey, teenagers ages 13 to 17 played games with friends they know in person (89%) and friends they know only online (54%). [5] This shows that it is reasonable to use a game to see how will people interact or build connections with each other.

Therefore, the author designed Music Encounter, a third-person 3D open world social adventure game set in a fantasy musical world. The player will meet new friends and explore the world with them or on their own. Music and sound are the major way of communication in this world, and the player will use those as tools to make friends, attack enemies and solve puzzles. The game will be set on Windows PC and Mac platforms.

The game was set up in the background of a magical world full of music. Everyone is a "Sonorians" (derived from the word 'sonorous' which means rich and full in sound), born with a melody of his persona, and with a musical instrument that he picked. In order to maintain the living

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[1] Beau Sievers et al., "Music and Movement Share a Dynamic Structure That Supports Universal Expressions of Emotion," Proceedings of the National Academy of Sciences 110, no. 1 (2012): pp. 70-75, https://doi.org/10.1073/pnas.1209023110.

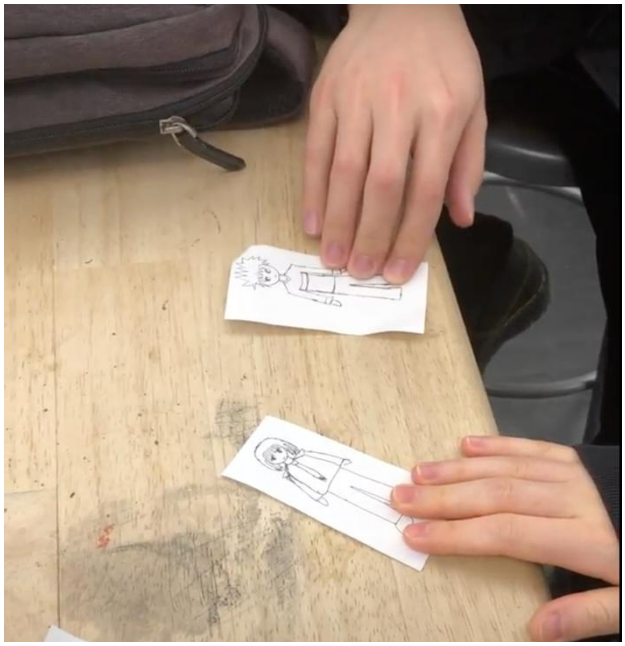
[2] Janelle Cox, "Music Taste and Personality: Are They Related?," Psych Central (Psych Central, July 14, 2022), https://psychcentral.com/lib/preferred-music-style-is-tied-to-personality#individual-differences.

[3] Beau Sievers et al., "Music and Movement Share a Dynamic Structure That Supports Universal Expressions of Emotion," Proceedings of the National Academy of Sciences 110, no. 1 (2012): pp. 70-75, https://doi.org/10.1073/pnas.1209023110.

[4] J. Clement, "U.S. Video Gamers Age 2022," Statista, October 17, 2022, https://www.statista.com/statistics/189582/age-of-us-video-game-players/.

[5] Amanda Lenhart, "Teens, Technology and Friendships," Pew Research Center: Internet, Science & Tech (Pew Research Center, May 30, 2020), https://www.pewresearch.org/internet/2015/08/06/teens-technology-and-friendships/.

world of the Sonorians, the Sonorians need to clear “chaos”, which are monsters that disturb the world of the Sonorians.



Design Process

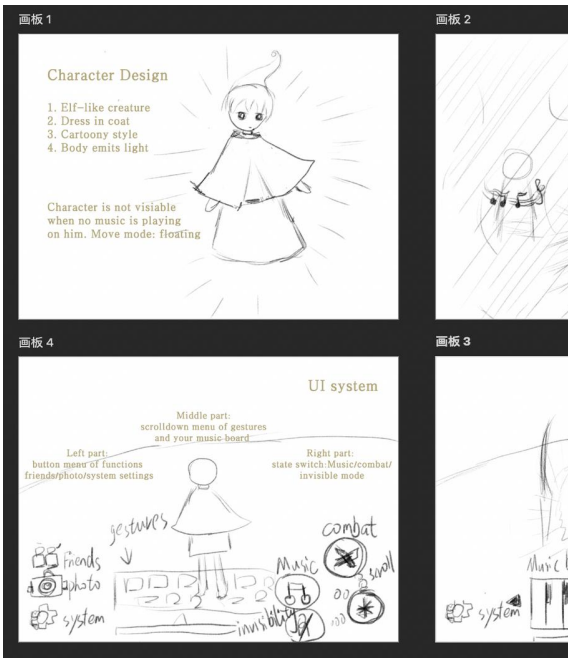
I. Research

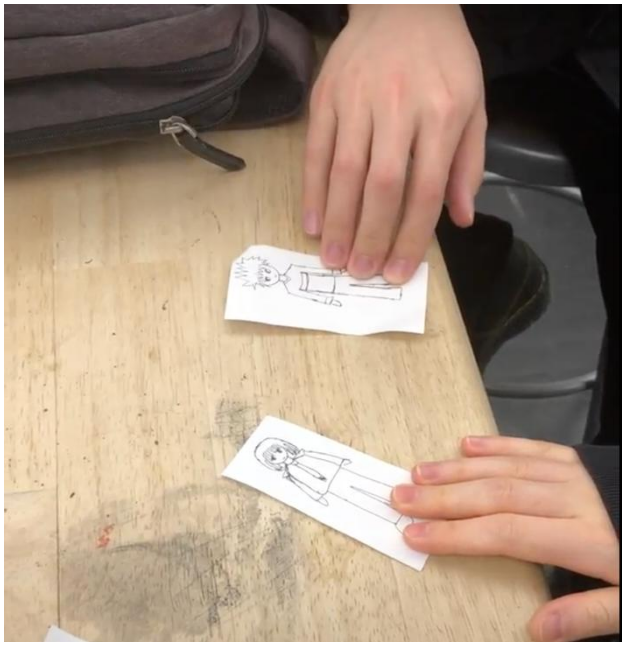
According to the author's research, until 2023, most games or social media applications have a relatively single function that contains musical elements. For example, there are music-based audio games: Karaoke Party, Beat Saber, QQ Dance, and Taiko no Tatsujin which allow players to sing/beat/dance according to the music. There are also some music social platforms such as Netease Music, Smule, and Yokee, which basically allow users to share their recorded songs and comments, and there is no way to interact with other people in depth. Those games and apps lack a diverse, integrated, and immersive platform for people to have communication on an emotional level and build in-depth connections with each other. Therefore, the author decided to design a 3D interactive game, incorporating music and sound as a major element, and integrating it with open-world exploration, so that players create more stories with their partners. Inspired by the game *Sky: Children of the Light and Journey*, the author decided to abandon/reduce the use of language and text, and use a minimalist and low-poly art style in the game, striving to bring relaxation and comfort to the players. The game is called *Music Encounter,* and it is aimed at young people aged between 12-35. These people usually have a strong adventure and social desire, although hypothetically the game may attract more introverted people.

II. Brainstorm & Prototype

The author created 5 characters on sketch paper and delivered the characters to different people for acting as the characters. The condition is, if people can only use sound effects and music to communicate/interact with each other, what will they do ? Will there be any difficulties in communication?

The result was there are several different outcomes when people meet. Some people gave common greeting sound similar to “Hello” and mimicked friend voices, trying to reach a resonance. Some people mimic the sound of fights and attacks. Some people kept silent. Inspired by the paper prototype, the author created the game design document, storyboards, and UI wireframes of the game.





III. Testing

The author developed the game through Unity Engine and uploaded the game onto itch.io to test the game. After players played the game, they will complete a Google form questionnaire asking about their gaming and interaction experience, etc. This is required for data collection. The game will contain two tests, an alpha and beta test, which are described as *Iteration I* and *Iteration II* below.

Iteration I: The game has implemented some basic core features and mechanics, including a character controller, UI interface, and instrument performance functions. The scene of the open world has been built using assets from the Unity Asset store, as well as player assets and animations. The character could move freely in the game environment and take various actions and expressions. A few musical elements were added to the game. Each character in the scene carries a melody of his persona.

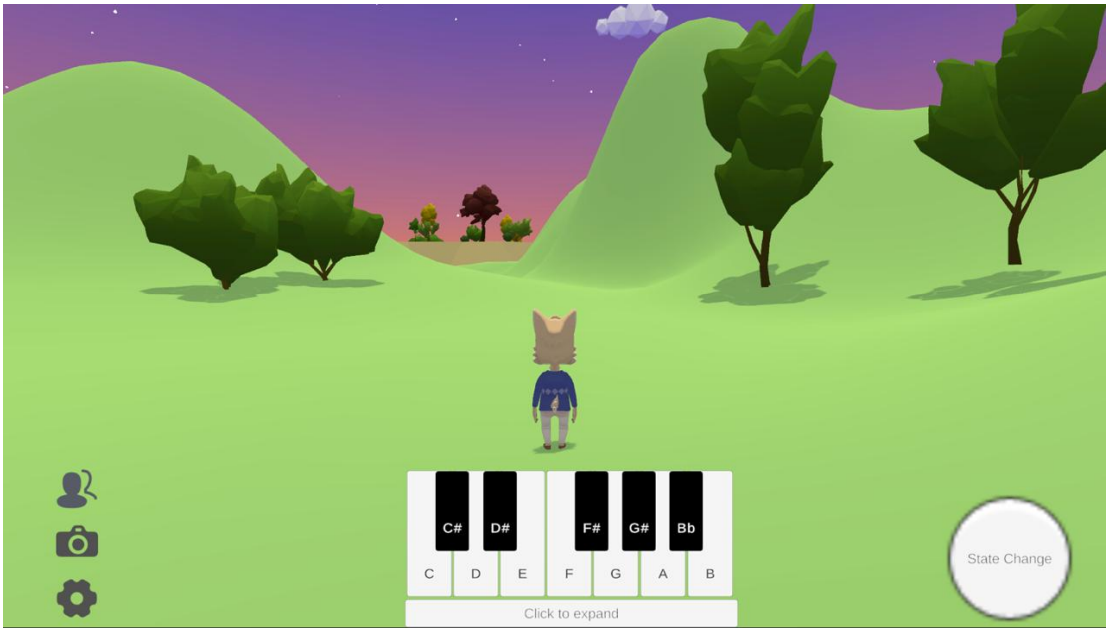


Figure 1 Iteration I

Iteration II: The game has implemented most of the features in the game design document. A more polished game environment was designed, with a wide range of places for the players to visit. Interactable game objects, new UIs, inventory systems, and NPCs were added to the game scene. More instruments could be played and a text-to-music notes input field was also added. When the player is close to other characters, they can hear the music surrounding them. If the player is interested in the music surrounded by other characters, they can try to talk to that character. A tutorial was added to the game, aiming to help people who are unfamiliar with the music and mechanics of the game.

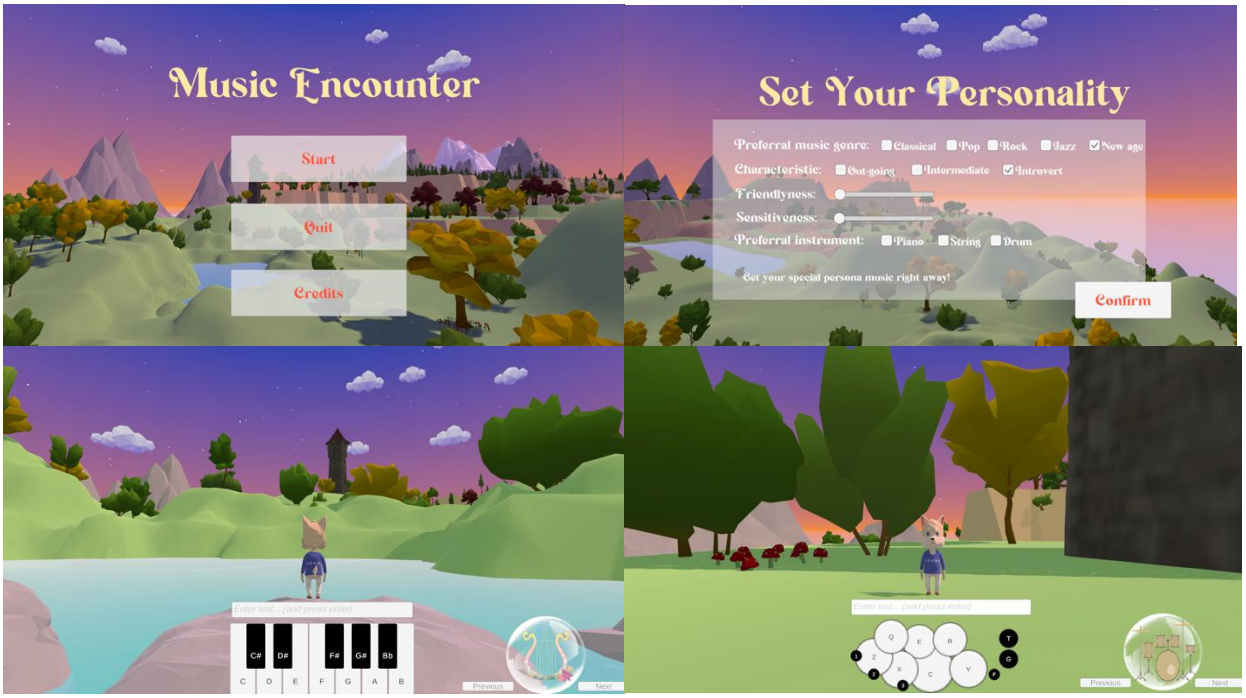
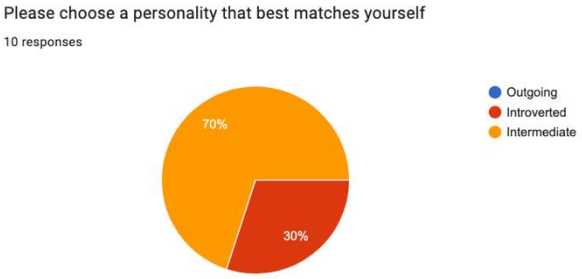


Figure 2 Iteration II

Results

The user feedback and gaming experience were collected through a survey that was delivered after people exited the game. The survey included questions such as demographic information, player's characteristics, player's satisfaction level with various functions in the game, the difficulties and problems they faced while playing the game, etc. Most of the questions in the survey use a five-point scale, while other questions are short answer questions. The players' in-game data, such as the total time they spent in the game, was collected through Unity Tinylytics. An iterative approach was used to improve players' gaming experience based on their feedback in the survey.

In the first iteration, a total of 10 responses were collected through the survey. Most of the people expressed a general interest in listening to the music inside the game and using music and sound to connect with other people. It is worth noting that these people have a neutral or introverted personality. Although they are usually nervous and sensitive, they think they are relatively friendly. This partly proved the author's hypothesis is correct, that Music Encounter would attract introverted people to play. Most people expressed a better art demand for game scenes, which may be related to the occupations of the sample population. They are students from art schools. In order to improve the quality and reduce biases in the feedback, the next survey will increase the sample size, collecting data from survey



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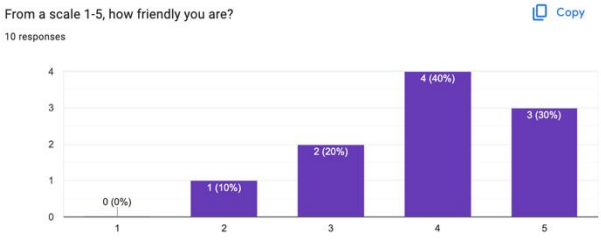
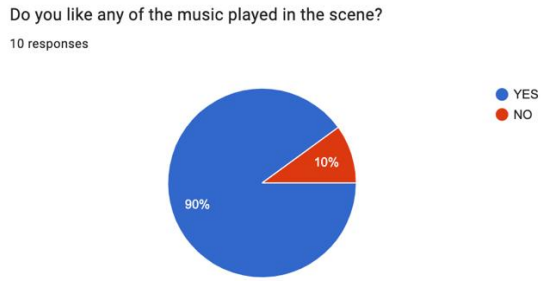
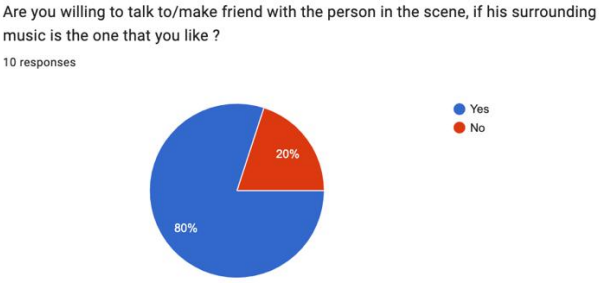
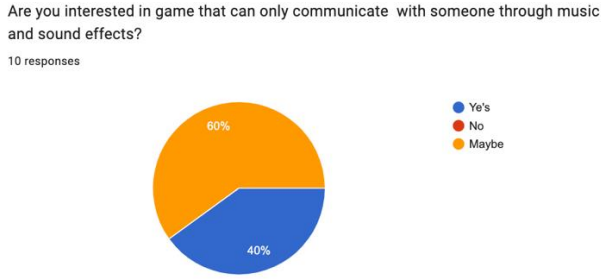
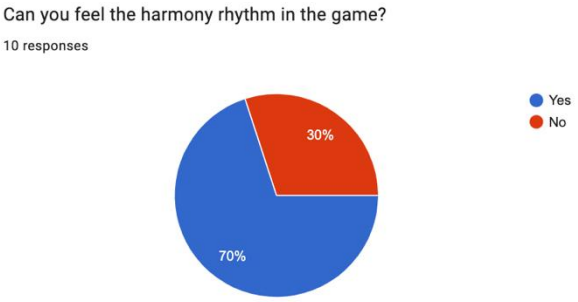




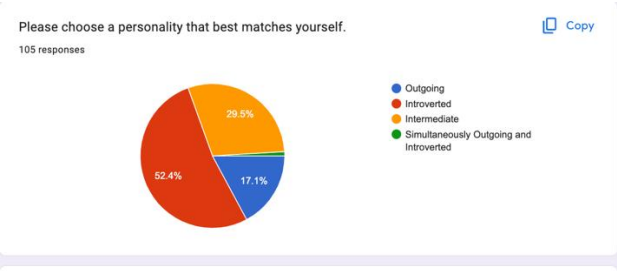


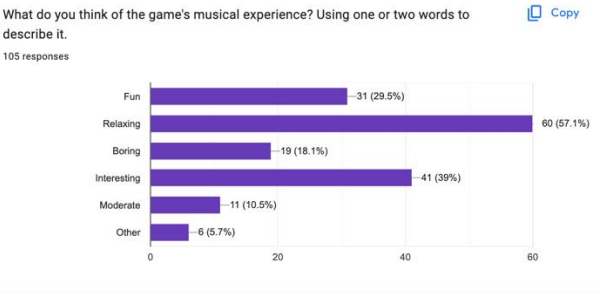


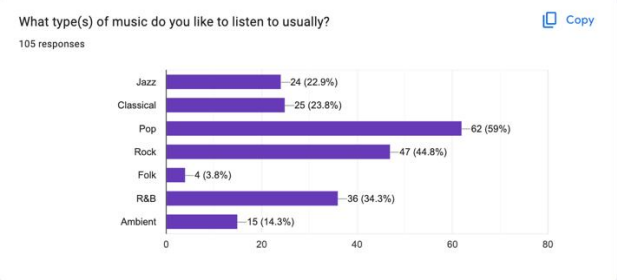


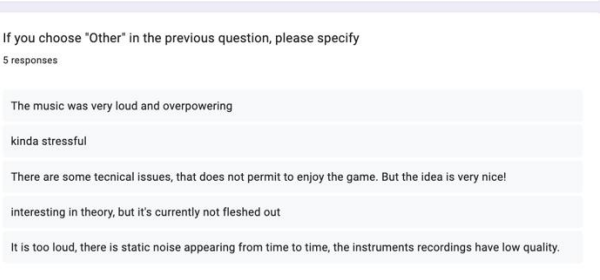
In the second iteration, a total of 105 responses were collected through the survey. Among the testers, 52.4 percent of them are introverted people, 17.1 percent of them are outgoing, and 29.5 percent of them are in between. Most of the testers like to listen to pop and rock music. 62.8 percent of people rated their overall gaming experience a score of 3+ out of five, and 72.3 percent of people rated their musical experience a 3+ out of five. They described their musical experience as "fun," "interesting" and "relaxing." These data show that the current idea or direction of the game is successful in appealing to the audience. Almost 50 to 50 percent of people like rate collecting different instruments and exploring the environment as the most interesting thing to do in the game. 95.2 percent of people said they like some of the music or musical instruments played in the scene. 82.9 percent of people would like to talk to someone if his surrounding melody is somewhat that they like or enjoy. 78.1 percent of people believe that playing music/sound together with someone increases their connection with others. These all suggest that there is a great possibility to use music to connect, match and build relationships between people.

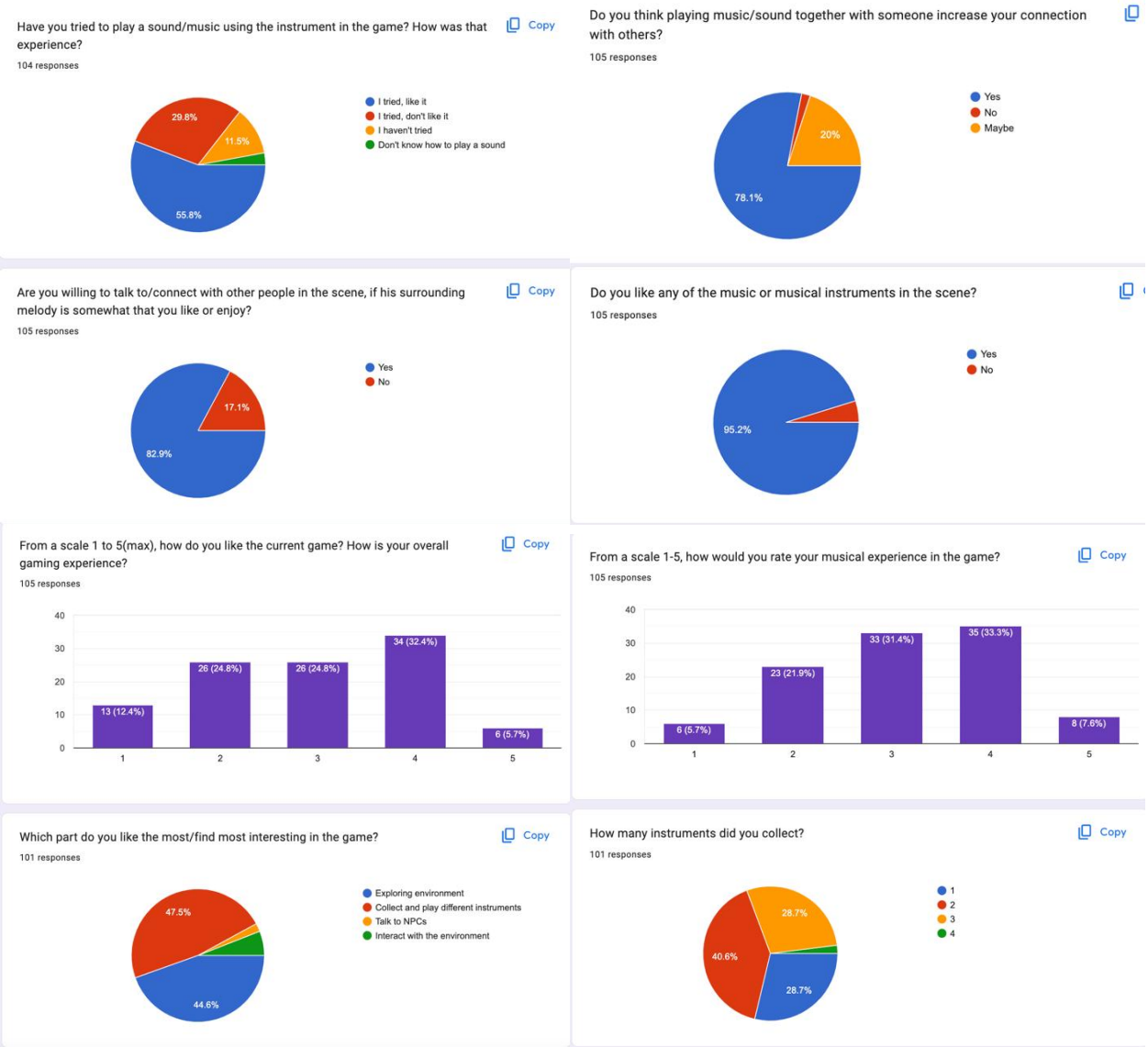
However, there are definitely things that could be improved about this game. 55.8 percent of people tried to play the instruments and found that they like it, but others did not or do not know how to play. There are a total of 4 instruments in the game, but most people could only find 1 to 3 instruments, which shows that there are still many spaces to enhance people's musical experience in the game. Other game feedback such as bugs and small problems was also collected through the survey.











Discussion

While the game succeeded in achieving the goal of creating an interesting interactive experience and finding connections between people as the data shown above, there were also many areas to improve. These will be discussed in the following sections.

1. **A larger random melody/music generation library is needed to generate music that matches people's diverse personalities.**

   Due to the limited time effort and technology restrictions of the project, there are only a few arrangements and combinations of choices of players' surrounding characteristic music. After the player chooses his personality and music preference, the game system will select a song that meets his requirements from the local music library, which is not truly some "randomly generated music". The ideal situation is that after the player has set his own personality, gender, age, music preference, etc., the AI will generate music that matches the input data, and the player can change or customize it afterward. The player can change the

music until it adheres to his own taste. A more completed project may need game creators to call the API of some AI music generation websites or even program a powerful AI with a considerable understanding of music and personality.

2. **More effective and interesting ways to communicate through music could be added to the game.**

   Due to the technical limitations of the project, the current in-game communication method can be converted into specific music notes by entering texts, so that other people can hear it. The ideal situation is that a player will give a prompt or enter a piece of text in the game's input field, and then music with corresponding context meaning could be generated by the system. Google's MusicLM is capable of creating text-generated music.[6] If there is a way to use MusicLM API calls, a more interesting user musical communication experience could be created. More AI technology development related to music is needed for people's gaming and social interaction.

   In addition, another music playback function mentioned in the prototype that can also be added to the game. The system should be able to link or read the player's Youtube music playlist, or the playlist of some other music software so that the player can listen to their music during the game. Players can even communicate through external music.

3. **A simple and easy-to-understand music creation/modification/customization method should be implemented.**

   According to user feedback, some people might not be knowledgeable to create music and use musical instruments, so a simpler and easier-to-use method or tutorial should be invented. Players also want to modify/customize their persona music. Some examples of simple music creation software for reference are Nodebeat and Playground.

4. **An abundant amount of music performance choices and new types of musical instruments should be designed.**

   According to user feedback, some people may hope that they can connect their Midi board, guitar, and other musical instruments to perform music in the game. A musical instrument interface could be added to the game, allowing people to perform the music they like in a traditional way.

5. **In order to test whether music has an impact on the social interaction between players, the multiplayer networking function of the game should be developed.**

   Due to development time and technology, the current game can only simulate and replace human-to-human communication and interaction through single-player interaction with NPCs and the surrounding game environment. Ideally, this game should be a multiplayer online social game.

6. **Inclusive Design**

   In future designs, it will be necessary to design games for some disabled/minority groups that are also applicable to them. Ideally, Music Encounter can also bring some interesting musical experiences to blind people, and help them make some friends. Just as the Universal principles should be implemented for environment and interaction in games when there are a wide variety of individual differences.[7] At the same time, when designing a

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[6] Andrea Agostinelli et al., "MusicLM: Generating Music from Text," arXiv.org, January 26, 2023, https://arxiv.org/abs/2301.11325.

[7] Damian Mills, Franziska Schroeder, and John D'Arcy, "GIVME: Guided Interactions in Virtual Musical Environments:" International Conference on New Interfaces for Musical Expression (PubPub, May 5, 2021), https://doi.org/10.21428/92fbeb44.5443652c.

multiplayer game, people should also try their best to avoid harming each other players and to guide all players to be friendly.

Conclusion

In conclusion, this paper demonstrates that it is possible to use music to create and strengthen connections between people and enhance their gaming experience. However, the impact of music and sound on people's social and gaming experience still needs further exploration and investigation, especially whether music has the same potential to help people to match as traditional dating/social apps. To launch Music Encounter, the game development team needs to improve current game functions, develop better networking and social functions, and solve some technical problems. In addition, questionnaires with larger sample sizes should be collected for research, testing, and iteration purpose.

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