**Exemption Justification**

Describe how the proposed research meets the criteria for exemption. Reference the exemption category or categories (IRB Exemption Categories) and the category’s corresponding requirements. (3000 chars)

The proposed study is believed to meet the criteria for Category 3 exemption for research involving benign behavioral interventions. In our experiments, participants will be presented a map and will listen to a song that represents an additional spatial data set other than what is visualized on the map. The songs heard by participants are brief in duration as the playback of a song will not be longer than one minute in each experiment, and the participant may stop the playback at any time during the experiment. The participant is also able to control the volume level of the earphone or headphone, and we will encourage them to set their volume to a comfortable listening level. Participants will complete the experiment in a safe low-risk environment, most likely in their own home. The sounds heard are either well-known compositions suitable for listeners of all ages (e.g., Twinkle Twinkle Little Star) which we believe will not offend or embarrass participants, or a song composed by randomizing the notes from these known songs with similar tempo. All experiments are anonymous and the information recorded will not directly or indirectly identify any participants as we only record mouse cursor movement and the participants response to the prompts about the spatial pattern of the spatial data presented.

**Summary of Research**

Briefly summarize the purpose and procedures of the proposed research using non-technical language that can be readily understood by someone outside the discipline. Use complete sentences. (5000 chars)

The research will investigate the effectiveness of sonic variables, such as loudness, clarity, and muffledness, in conveying an additional dimension of spatial data to human listeners. In our experiments, the participants will be presented a map and listen to a song that represents an additional spatial data set other than what is visualized on the map. The additional data is not displayed on the map and is called the behind-the-scenes data or BTSD. Each location on the map will have a BTSD value associated, which is used to alter the song. When the listener moves the mouse cursor across the map, the song will be modified in terms of its loudness, clarity, and muffledness based on the BTSD. Our first objective is to determine which sonic variables significantly affect the listener’s ability to identify some simple spatial patterns (e.g., locations and number of high and low values) on the map. Our second objective is to determine whether visual effects on the map has significant impacts on the listener’s understanding of BTSD. Our third objective is to determine whether the listener’s familiarity of the song influences their ability to recognize patterns in the BTSD.

**Beginning date:** June 1, 2021

**End date:** July 15, 2021

**Number of Participants**

Provide the total number of participants (or number of participant records, specimens, etc.) for whom you are seeking Ohio State University approval. (500 chars)

15 adult volunteers (age eighteen and over)

**Participant Population**

Specify the age(s) of the individuals who may be included in the research:

Participants will be 18 years old and over.

Describe the characteristics of the proposed participants, and explain how the nature of the research requires/justifies their inclusion. (3000 chars)

We will recruit volunteers in academia, especially those with backgrounds in geography and/or using maps to portray spatial data. The rationale behind choosing participants with these characteristics is they are individuals who have a necessary background of understanding of how spatial data is viewed on the map.

**Participant Identification**

Describe how potential participants will be identified (e.g., advertising, individuals known to the investigators, record review). Explain how the investigator(s) will gain access to this population, as applicable. (3000 chars)

We will use online-bulletin boards, email mailing lists, in-class announcements, and personal contacts to reach to potential participants. Specifically, we will invite graduate students in Geography programs, faculty members in the area of geographic information science, as well as current and former Ohio State undergraduate and graduate students.

Describe the recruitment process, including the setting in which recruitment will take place. Enter 'not applicable' if the research involves only record review and no participant interaction. (3000 chars)

Recruitment will take place digitally. There will not be any in-person participant interaction.

**Informed consent Process**

Describe the consent process. Explain when and where consent will be obtained and how subjects and/or their legally authorized representatives will be provided sufficient opportunity (e.g., waiting period, if any) to consider participation. (3000 chars)

The experiments are anonymous. Potential participants will be sent a recruitment flyer through email between the hours of 8 am and 5 pm which will explain the experiment procedures, tasks, and safety precautions in the experiment. A web URL will also be included in the email. If a potential participant is interested to participate, he or she will log on to our web page where the consent form is displayed (also attached to this IRB application). If the participant agrees to participate, he or she can click on the ACCEPT button to start the experiments. The experiment will not continue unless the button is clicked.

**Participant Privacy**

Describe the provisions to protect the privacy interests of the participants. (3000 chars)

All data collected in this study will be anonymous. We do not collect personal identifiable information like name, age, gender, sensitive computer and network information, or health information such as copies of previous hearing tests. The only data we will collect is the mouse trajectory and participants' responses to the questions after each experiment about the spatial pattern.

**Confidentiality of Data**

Explain how information is handled, including storage, security measures (as necessary), and who will have access to the information. Include both electronic and hard copy records. (4000 chars)

All the data collected will be stored as a text file on the server that runs the experiments. The server is located on Ohio State campus and is password protected. Access to the files requires the OSU’s DUO two-factor authentication procedure. Only the investigators in this study can access the information stored on this server. No one without the approval of the investigators on this research can access the data. Again, all the data stored are anonymous without personal identifiable information.