

Do Adult Female CBA/CaJ Mice Show a Preference for the Vocalizations of Cage Mates Over the Vocalizations of Strangers?

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Introduction

Mice are social animals, meaning communication is a key to their survival. Communication requires a sender of information (e.g., vocalizing mouse) and a receiver of that information (e.g., listening mouse). Mice produce ultrasonic vocalizations (USVs) under a number of communication contexts. One way to understand acoustic communication in mice is to study the way calls are perceived. This is most commonly done through preference studies. Preference studies allow researchers to observe a mouse choosing one stimulus versus another. Female mouse preferences for male vocalizations are common topics of preference studies, however few have examined exclusively how female mice respond to other female USVs.

The current study examines ten female adult CBA/CaJ mice's preference of ultrasonic vocalizations (USVs) made by a familiar or unfamiliar mouse. Familiar mice will be cage mates of the test mouse, while unfamiliar mice will be a novel socially housed animal. Each test mouse will be exposed to all cage mate and stranger vocalizations. Preference will be measured by the amount of time the test animal spends inspecting and staying near a speaker on either side of the test cage. Caller familiarity will be the independent variable of the study while preference will be the dependent variable.

Hypothesis 1: Cage mate status will influence the test mouse's ability to "recognize" vocalizations made by cage mates because that mouse will be familiar with the calls produced by mice they live with.

Hypothesis 2: Familiarity will cause the test mouse to inspect the speakers playing cage mate calls for longer than they inspect the speakers playing stranger calls.

Methods

Subjects: Figure 1 depicts ten CBA/CaJ strain female mice were used during this experiment. Five mice are socially housed in a large cage (25.5 cm x 16.5 cm x 48 cm), and five in another separate large cage.

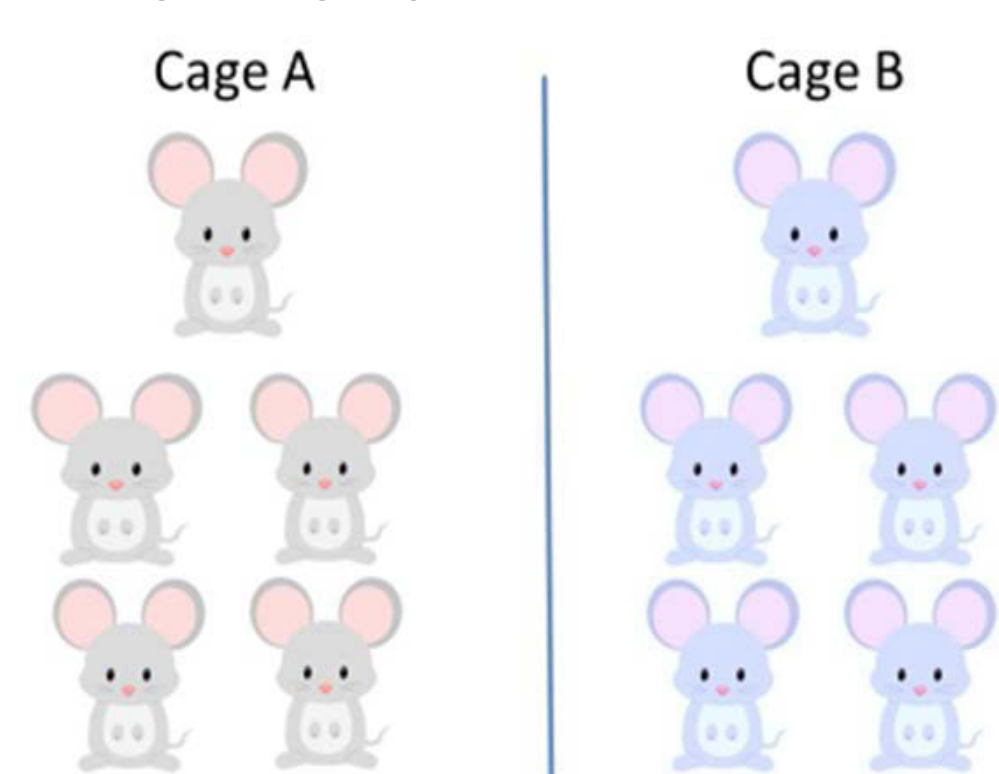


Figure 1. Mice divided by cage.

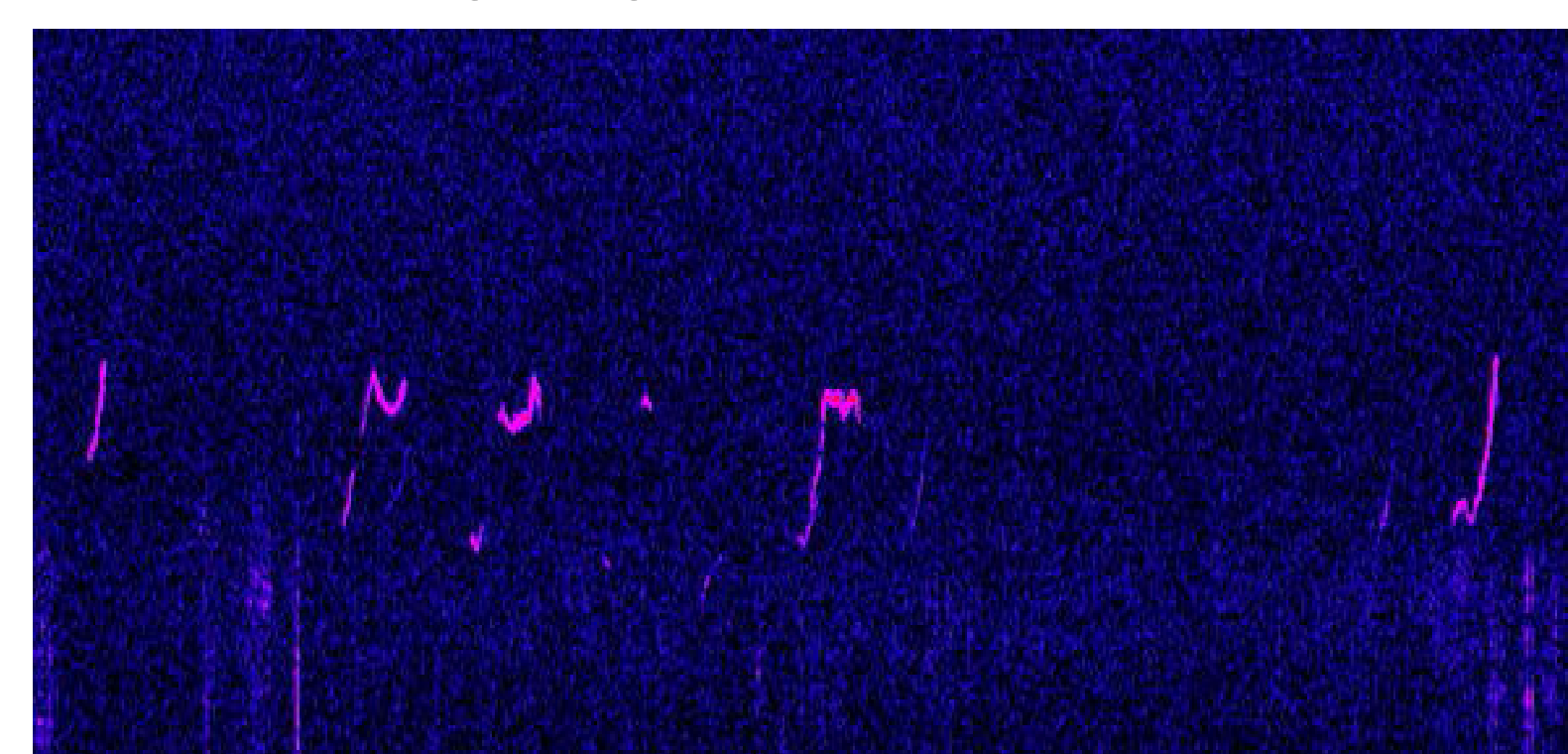


Figure 2. Female mouse ultrasonic vocalizations

USV Recordings: USV were recorded from all 10 female mice. The recordings from each mouse were analyzed to find the greatest number of calls (regardless of type) in a 10-s section. Once these sections were identified, a 60 s stimulus loop was created for all 10 mice. Figure 2 depicts a section of the playback recording.

Apparatus and Equipment: Depicted in Figure 3. Mice were placed in the center of a 3-compartment cage and time spent in each zone was measured for each stimulus condition.

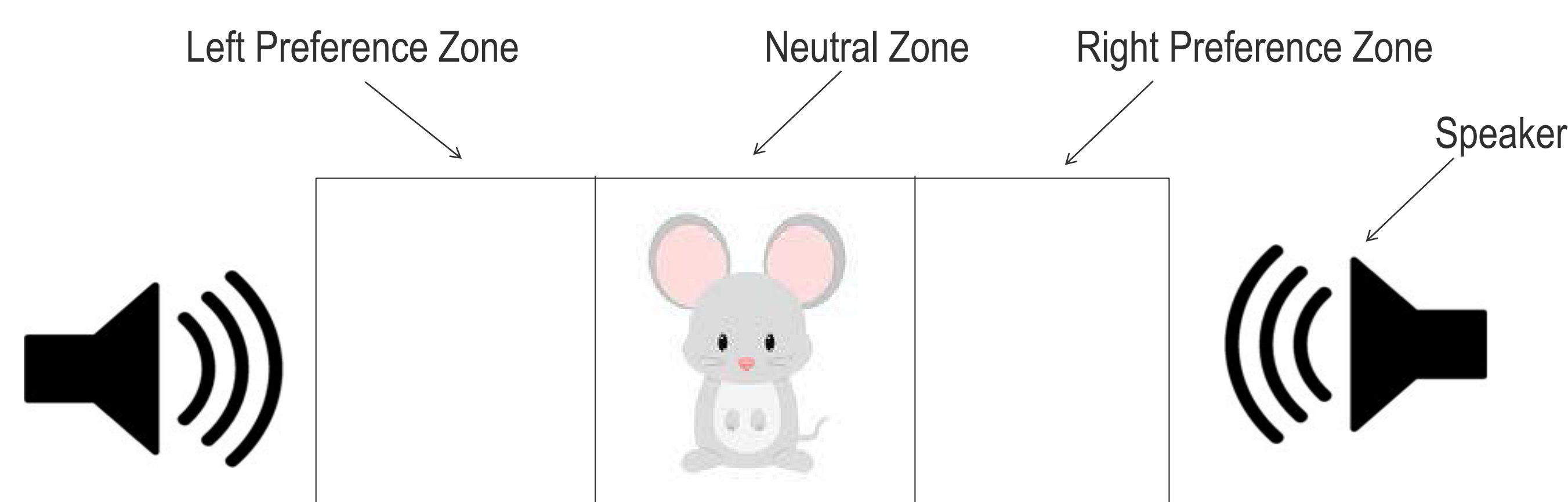


Figure 3. Preference apparatus.

Procedure

- To familiarize test females with the apparatus, on the day of testing they will be placed in the neutral zone of the apparatus and allowed to explore the cage for 30 seconds to habituate.
- The 60-s recorded cage mate USVs and 60-s stranger USVs will play simultaneously from the speakers. The recordings will be played once, meaning sessions will last for a total of 1 minute 30 seconds.
- Each trial will be video recorded using a secured web camera (Microsoft Lifecam Cinema) from the top of the recording box.
- With each test mouse being exposed to all cage mate vocalizations with the exception of its own and exposed to all of the stranger vocalizations, there will be a total of five trials for each of the 10 mice for a total of 50 trials all together as shown in Table 1.
- Each trial per mouse will be separated by at least a week to avoid habituation.

Subject	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
A1 (Regina)	Ani V. Tumblr (A2/B2)	Janis V. Insta (A3/B4)	Joan V. Twitter (A4/B5)	Kimya V. Snap (A5/B3)	Janis V. Fb (A3/B1)
A2 (Ani)	Janis V. Snap (A3/B3)	Joan V. Twitter (A4/B5)	Kimya V. Tumblr (A5/B2)	Regina V. Fb (A1/B1)	Regina V. Insta (A1/B4)
A3 (Janis)	Joan V. Insta (A4/B4)	Kimya V. Fb (A5/B1)	Regina V. Tumblr (A1/B2)	Regina V. Snap (A1/B3)	Ani V. Twitter (A2/B5)
A4 (Joan)	Kimya V. Twitter (A5/B5)	Regina V. Tumblr (A1/B2)	Ani V. Snap (A2/B3)	Janis V. Insta (A3/B4)	Janis V. Fb (A3/B1)
A5 (Kimya)	Regina V. Fb (A1/B1)	Ani V. Snap (A2/B3)	Janis V. Tumblr (A3/B2)	Joan V. Insta (A4/B4)	Janis V. Twitter (A3/B5)
B1 (Facebook)	Ani V. Tumblr (A2/B2)	Janis V. Insta (A3/B4)	Joan V. Snap (A4/B3)	Kimya V. Twitter (A5/B5)	Regina V. Insta (A1/B4)
B2 (Tumblr)	Janis V. Snap (A3/B3)	Joan V. Twitter (A4/B5)	Kimya V. Fb (A5/B1)	Regina V. Insta (A1/B4)	Ani V. Insta (A2/B4)
B3 (Snapchat)	Joan V. Insta (A4/B4)	Kimya V. Fb (A5/B1)	Regina V. Tumblr (A1/B2)	Janis V. Twitter (A3/B5)	Ani V. Twitter (A2/B5)
B4 (Instagram)	Kimya V. Twitter (A5/B5)	Regina V. Tumblr (A1/B2)	Janis V. Fb (A3/B1)	Joan V. Tumblr (A4/B2)	Ani V. Tumblr (A2/B2)
B5 (Twitter)	Regina V. Fb (A1/B1)	Ani V. Snap (A2/B3)	Joan V. Tumblr (A4/B2)	Kimya V. Insta (A5/B4)	Janis V. Snap (A3/B3)

Table 1. Vocalization exposure conditions. There are 5 trials per animal with different combinations of familiar and unfamiliar USVs presented on each trial for each subject.

Preliminary Results

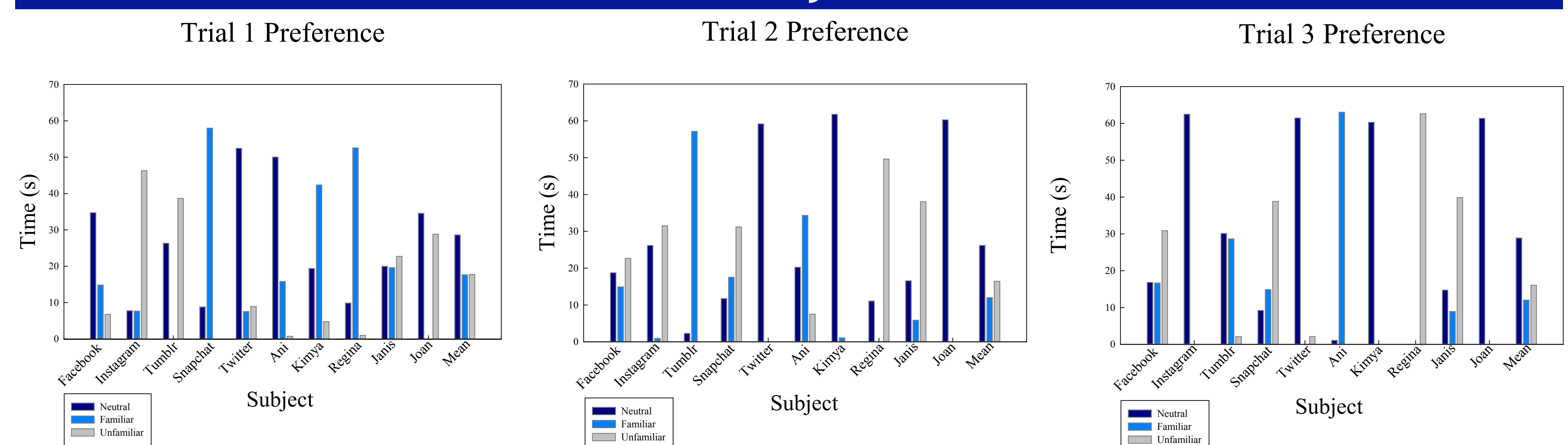


Figure 4. Time in seconds spent in chambers (Neutral, Familiar, and Unfamiliar) per individual animal was measured. Mean time spent per chamber was analyzed across all 10 animals. Throughout 3 trials, animals spent the most time in the Neutral Chamber and Unfamiliar Chamber.

Preliminary Conclusion

According to preliminary results, while we are unable to assess the validity of Hypothesis 1, we fail to reject the null hypothesis for Hypothesis 2; it appears that the mice do not have a preference for the familiar USVs. This is most evident in Figure 4, where we see that as time progresses, the animals show an overall greater preference for the unfamiliar USV – this will be a topic of future study as we investigate mice preference towards novel sounds.

Acknowledgements

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