Effects of different tempos of Mozart's music on learning performance and general behavior in rats

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Abstract

The study of music with different rhythms on the learning behavior of rats in memorizing the door position change pattern in the Monty Hall problem model was conducted by dividing the rats into three groups: a group that listened to fast-tempo music, a group that listened to slow-tempo music, and a group with no music. Before testing their behavior, the rats in the slow and fast music groups were exposed to the music for one week, specifically Sonata for Two Pianos in D Major, K. 448 by Mozart. Afterward, all three groups were tested for their learning behavior in the Monty Hall problem model for another week. The results showed that the groups exposed to either slow or fast music took significantly less time to choose the correct door compared to the group that did not listen to any music. The group that performed the fastest was the one exposed to slow music, followed by the fast-music group, with the silent music group performing the slowest. Additionally, the silent music group made the most errors and had the highest to not responding to the experiment.

Introduction

The use of music in therapy and environmental enrichment plays an important role in promoting behavior and psychological development in both humans and animals. Listening to music can stimulate the functioning of the limbic system in the brain (Sutoo and Akiyama, 2004), which affects emotions, memory, and learning, as well as enhances spatial memory and improves neural plasticity (Xing et al., 2016). Listening to music can also help regulate emotions, such as reducing stress and anxiety. Additionally, enriching the environment with music helps stimulate appropriate behaviors in experimental animals (Bloomsmith et al., 1991), such as rats, and promotes mental health. By introducing music as a stimulus, it can help improve animal behavior, reduce stress, and enhance learning. Therefore, this study aims to test whether rats exposed to music with different tempos show different learning behaviors and other behaviors.

Materials and Methods

Sonata for two pianos in D, K.448 By Mozart

week 1

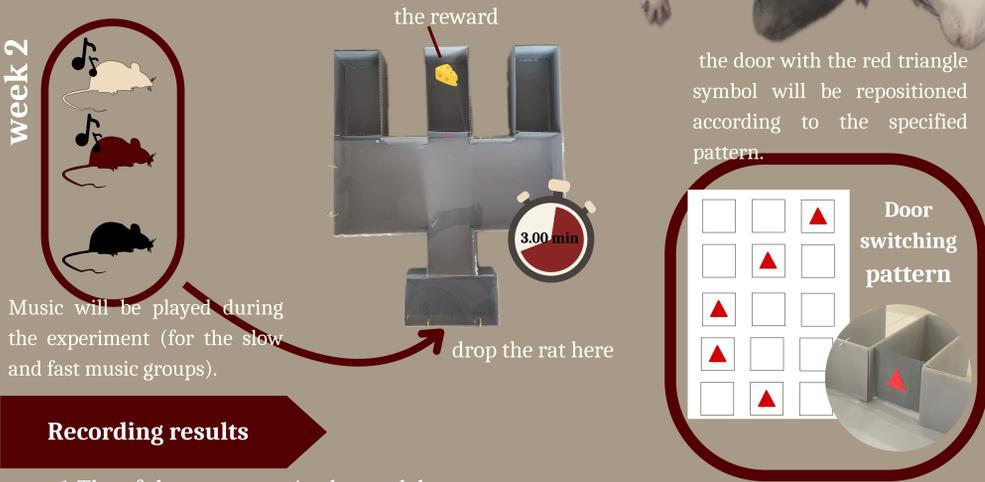The rats will be divided into 3 groups, with 5 rats in each group.

x5 Slow music group (0.5 x)

x5 Fast music group (2.0 x)

x5 Silent group

1 hour per day

week 2

the reward

the door with the red triangle symbol will be repositioned according to the specified pattern.

3.00 min

Music will be played during the experiment (for the slow and fast music groups).

drop the rat here

Door switching pattern

Recording results

1. The of the rats spent in the model.
2. Number of times the rats walked into the wrong door.
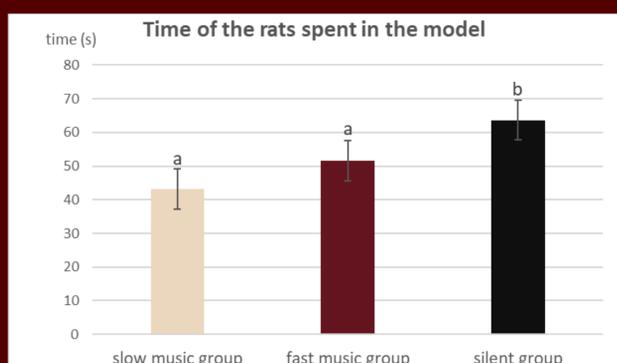3. behavior of the rats while in the model.

Results

Figure1 : The graph illustrates the average time taken by rats in each group (slow music, fast music, and no music) to navigate to the correct door in the model.
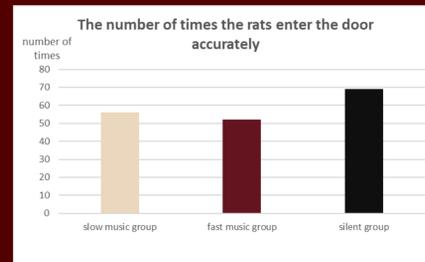

Figure2 : The graph of the number of instances in which the rats accurately selected the correct door.
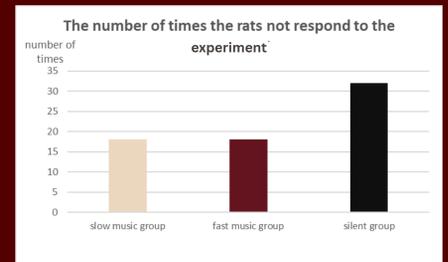

Figure3 : The graph of the number of instances in which the rats not respond to the experiment.

Figure4 : The pie chart represents the average behaviors exhibited by the rats during the experiment.
A) behavior in slow group
B) behavior in fast group
C) behavior in silent group

Conclusions

The results of this study suggest that music with different tempos affects the behavior of rats in various groups when placed in a model. The group of rats that took the least time to find the correct door was the one that listened to slow-tempo music, followed by the group that listened to fast-tempo music, and the group that took the longest time was the one with no music (Figure 1). The factors leading to the differences in the time spent selecting the correct door among the groups were based on the behavior of the rats during the experiment. The rats in the slow-tempo music group had moderate accuracy in selecting the correct door, while the rats in the fast-tempo music group showed the least accuracy but demonstrated higher movement or walking activity compared to the other groups. The rats in the no-music group, although they had the highest accuracy in door selection, had the lowest response rate. This was because the rats in this group tended to remain still and crouched, doing nothing until time ran out, which led to the highest average time spent in this group (Figure 2, Figure 3, and Figure 4).

Acknowledgments

References

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